

# THE COMMERCIAL CAR JOURNAL



The usual motor truck economy plus the unusual economy of the worm gear drive is provided by the

## PIERCE-ARROW 5-Ton Motor Trucks

THE *first* advantage of the worm gear drive is a saving in power. It delivers more of the motor's power to the rear axle than is possible with any other kind of final drive used—and unlike all other kinds, it does not lose in efficiency with wear.

The *second* advantage is a saving in upkeep and maintenance. The worm gear drive wears several

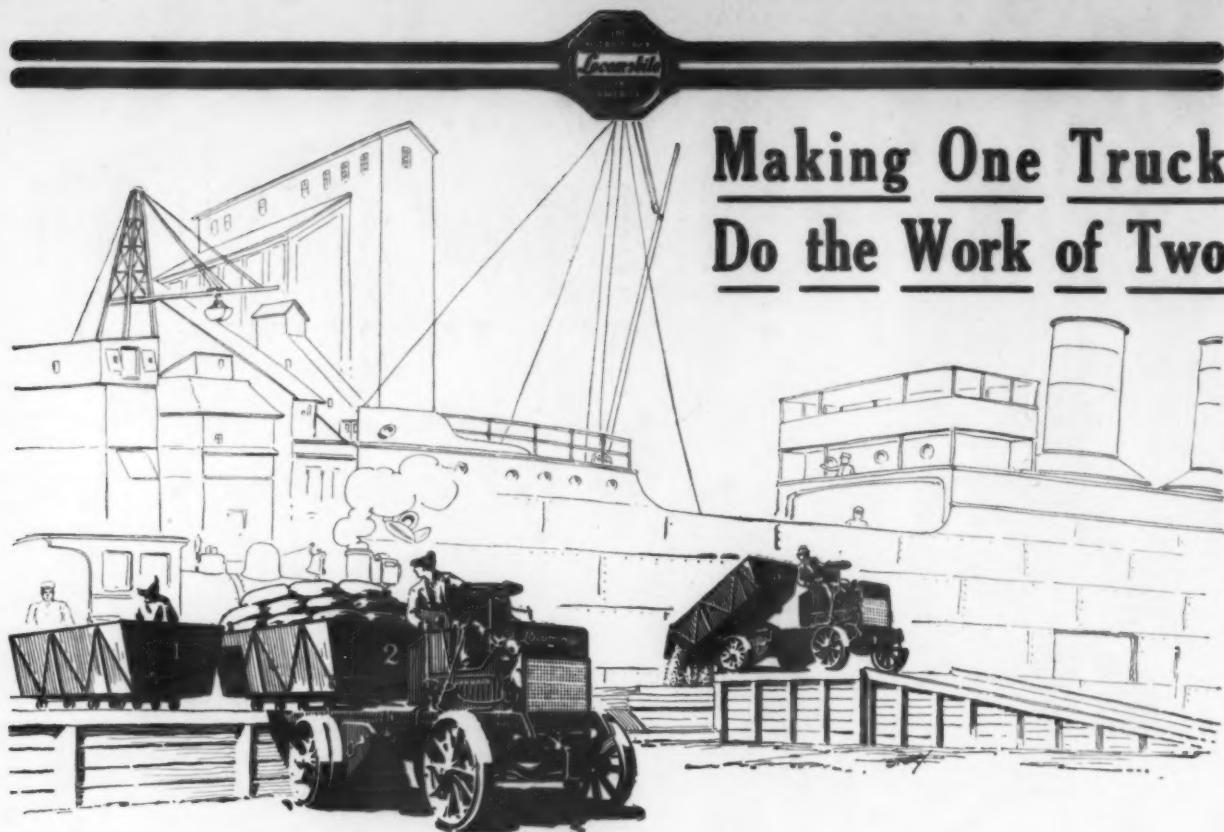
times as long as chains, requires oil only once for every 5,000 miles and needs no other attention.

The *third* advantage is that of dependability. The worm gear drive does not break on the road, as is common with chains.

The *fourth* advantage is one of silence. The worm gear drive runs smoothly, without vibration or noise.

The sum total is an advantage in economy and satisfaction too large to overlook.

THE PIERCE-ARROW MOTOR CAR COMPANY, BUFFALO, N. Y.



## Making One Truck Do the Work of Two

### The Locomobile Five-Ton Truck With Power-Operated Demountable Dumping Body keeps the truck chassis working all the time

**No. 1. Reloading empty body** which has just been deposited on platform under power from engine controlled by man on seat with lever at side.

**No. 2. Taking loaded body on chassis.** Demounting and remounting performed by engine power controlled by man on seat with side lever. 3 minutes to change bodies.

**No. 3. Body being dumped by power** from engine controlled and operated by same mechanism that demounts body. Total time to dump, 1 minute.

It is to a truck what a grain elevator, coal crane, belt conveyor or steam shovel is to a railroad car or steamboat. These apparatus increase the earning capacity of common carriers by shortening their period of idleness and lengthening their period of work.

The Demountable Dumping Body increases the earning capacity of a heavy-duty truck by eliminating the time required to load and unload the body.

With duplicate bodies the truck chassis may deliver a loaded body while the empty body is being filled. The

bodies are changed by power from the engine in less than three minutes. They are dumped by the same mechanism in one minute.

Continuous operation of the truck chassis is thus assured and a heavy-duty truck made profitable for short-haul work.

There are many types of these bodies for as many different purposes. If you need a special installation our engineers will build one to suit your requirements.

*Send to any of our branches for literature, estimates and detailed specifications on your hauling problem.*

### The Locomobile Company of America Offices and Works: Bridgeport, Conn.

#### BRANCHES

New York      Boston      Philadelphia      Atlanta  
Chicago      Washington      St. Louis

Pittsburgh

Minneapolis

#### BRANCHES

Baltimore      Los Angeles  
San Francisco      Oakland



When Writing, Please Say—"Saw Your Ad. in the C C J"

## The Fulfillment of an Ideal

We have taken the fragmentary history of the AUTOCAR, recently written by Mr. L. S. Clarke, Vice President of the Autocar Company, to illustrate the conscientious workmanship that has entered into the design and construction of all AUTOCAR Motor Delivery Vehicles. The AUTOCAR was established in 1897, and is among the pioneer Automobile Concerns of this Country. The early efforts to produce a horseless vehicle had many reverses, but persistence prevailed. Today the AUTOCAR stands as a leader in its class of a 3000-pound motor delivery vehicle. We will gladly send, upon request, this complete history, written by Mr. Clarke, to any one interested in the early development of the motor-vehicle industry. Following is that portion of the history as applied to the development of the present AUTOCAR Motor Delivery Car:

"In the summer of 1907, feeling that the time was ripe for the production of the commercial car, about which we had been dreaming for a number of years, our Engineering and Sales Departments got together and laid down a few principles which we felt necessary to incorporate in the design, these principles being as follows:

Design of car to be of maximum simplicity of parts, combined with a very rugged construction that would enable it to operate economically on solid or pneumatic rubber tires.

That the various elements entering into its design should be so arranged as to secure a maximum body platform with a minimum overall length of car, and a minimum wheel-base; that the live load should be as uniformly distributed over all four wheels as possible, eliminating overhang in the rear, and overload on the rear axle. We have made a particular feature of the compact design of our car, to enable it to readily manoeuvre in the crowded traffic of our streets, be backed into the curb, and to occupy as little valuable floor-space in the garage as possible. These are points which experience has proved to be of the greatest value.

That only the highest grade of materials should be used.

That the design be of such a nature that modifications could be made in it from year

to year, as necessity might require, without radically changing the fundamental plans.

A glance at these requirements showed us that it would be quite out of the question to consider modifying any of our touring-car designs with reasonable hopes of success; therefore, we launched out upon new and independent lines.

Having built a double opposed motor for so many years, and recognizing its good points, we at once concluded that, owing to its much greater simplicity than the four-cylinder, we should adopt the two-cylinder type of engine. This motor had another great advantage, in that its form permitted it being located beneath the driver's seat, thus economizing a great deal of space which would otherwise be lost.

This position of the motor at once suggested inaccessibility, and to answer that very proper criticism, we produced and patented our lifting-seat structure, which has proven of the greatest value and thoroughly practical in every way; in fact, it is possible to secure access to our truck much more readily than in the case of cars with the motor in the bonnet in front of the driver.

To protect the owner from excessive upkeep charges due to careless or reckless drivers, the motor was provided with a hydraulic governor that would limit the speed of the car. This governor is of an exceedingly simple design and very effective.

Another thing we did to save the car from abuse due to ignorance was that we so arranged our sparking system that it could not be controlled by the driver.

Our early experience with the chain drive was quite sufficient to convince us that such a system of drive in a commercial car of our class was quite out of the question; therefore, we took the idea of our compound rear bevel-and-spur drive, greatly refining it throughout, and incorporating the full-floating type of axle, in which none of the load of the car was



carried by the drive axle, the latter simply transmitting the power from the motor to the wheel.

Each and every point in the design of our commercial car has received the most minute attention, and has been adopted only after exhaustive tests, covering quite a period of time; that the design is not, in any sense, accidental; that it was thoroughly thought out before the first car of the type was built, and that experience has shown the value of our ideas.

Shortly after entering the commercial car field, we discovered difficulty in securing, for our friends and customers, the services of men to drive, who were sufficiently equipped with mechanical knowledge to satisfactorily operate the car. As a rule, the prospective buyer had a teamster whom he wished to retain in his service, but the man, having only experience with horses, was entirely unfamiliar with the handling of an automobile. We, therefore, established our school for drivers, which has yielded most gratifying results, not only to ourselves, but to concerns operating our cars. We maintain these Schools at our Branches in Philadelphia, New York, and Boston, and since their inception have turned out something like three thousand drivers, practically all of whom have been competent to properly handle the cars.

The greatest cause for trouble in the use of any piece of machinery, including an automobile, can be frequently attributed to lack of knowledge of its construction and its limitations, and conversely, the greater intelligent care will be its efficiency and economy. Therefore, we cannot urge too strongly the importance of placing your cars in the hands of competent men and giving them time to thoroughly examine and lubricate their cars each day. We are here to help you in every way we can, as it is our aim to make the AUTOCAR such an indispensable adjunct to your business that you could no more afford to do without it than you could without your telephone."

*Write for Book—"The History of the Development of a Motor Vehicle."*

**The Autocar Company=Ardmore, Pa.**

ESTABLISHED 1897

**MOTOR DELIVERY CAR SPECIALISTS**

When Writing, Please Say—"Saw Your Ad. in the C C J"

USED IN EVERY LINE OF BUSINESS



NINE AUTOCARS OWNED BY UNITED STATES EXPRESS CO.

## SELECTION

In purchasing machinery for your business, a very thorough investigation is usually made before you finally install. You buy good quality, consistent with your requirements of the "wear-well, satisfying-service kind." The *right kind* of motor vehicle has proved to be a big saving and a developing factor in every line of business. The number of makes of cars on the market, and their universal claim for satisfying purchasers has made it difficult for the business man to make his selection consistently.

## But Why Experiment?

Leading concerns in every line find the AUTOCAR indispensable. They have proven a profitable investment almost the moment they were introduced into service. The constant repeat orders, amounting to 48% of our sales, is evidence of satisfied value. We can prove the economy of our product over the horse-drawn vehicle. We can verify its business-producing value. We will show you how business concerns have advanced and made a sweeping increase in their business. In some cases these concerns have started at the bottom and climbed to prominent places in their line with the aid of an AUTOCAR. Below we give you a few concerns using fleets of AUTOCARS, who did not experiment, but bought material of proven value.

### PARTIAL LIST OF AUTOCAR USERS HAVING 5 CARS AND UP.

AUTOCARS		AUTOCARS	
Adams Express Co.	124	City Water Works	8
American Express Co. (Boston, Mass.)	11	Los Angeles Transfer Co.	8
American Society for the Prevention of Cruelty to Animals	6	William Necker	23
Armstrong Transfer Co.	6	New Jersey Ice Cream Co.	5
L. Bamberger & Sons	12	Newark Fireproof Storage Co.	7
Bekins Van & Storage Co.	5	Omaha Fireproof Storage Co.	5
Berg Brothers	5	Manufacture Outlet Co.	12
Borden's Condensed Milk Co.	10	Pacific Telephone & Telegraph Co.	5
A. F. Burrott Brothers Co.	6	Pareed Post Delivery	24
Joe G. Darlington & Co.	5	Pareed Service Corporation	5
Peter Doelger	5	Pennsylvania Taximeter Cab Co.	42
T. Eaton Co.	5	Michael & Co.	5
John V. Farwell Co.	5	The Royal Blue Line	7
Freshofer Vienna Baking Co.	9	The Searchlight Gas Co.	5
Gibbons-Wetherill Service Co.	7	M. E. Sexton	7
Ginsburg Brothers	5	Shredded Wheat Co.	17
A. Gobel	5	Shubert and Co.	27
Great Western Power Co.	7	N. S. Snelbenton & Co.	6
J. M. Morton Ice Cream Co.	5	So. California Edison Co.	5
Interborough News Delivery Co.	5	Strawbridge & Clothier	12
Lit Brothers	9	Richard E. Thibaut	7
Long Island Railroad Co.	18	U. S. Express Co.	9
Lord & Taylor	16	John Wanamaker	104
	8	R. H. White Co.	11
		Windsor Land & Improvement Co.	5

In accepting the buying judgment of firms like these,  
you cease experimenting.

**The Autocar Company — Ardmore, Pa.**

ESTABLISHED 1877

AUTOCAR DELIVERY CAR SPECIALISTS

When Writing, Please Say—"Saw Your Ad. in the C C J"



THE BROWN LINE AUTO TOURS



AUTOCAR STREET SPRINKLER

### Opening Season for Auto Tours

The type of AUTOCAR shown above has a seating capacity of fifteen passengers including driver. Side curtains are provided, making the car entirely enclosed. Touring-car type of folding top. This type of car is used by the Brown Touring Line in making daily round trips from Philadelphia to Valley Forge. W. C. Voorhees covers a similar trip with the same type of car. The Royal Blue Line, of Boston, Mass., own seven of these AUTOCARS, carrying touring parties to distant points, starting from Boston. These cars are used in this section of the country during the summer season, and in the winter season are sent for similar use to points in the Southern states. Other users of passenger-transportation AUTOCARS are: Church's Stage Line, Little Compton, R. I.; Howard V. Chamberlain, Belmar, N. J.; Sanchez & Mestre, Utuado, P. R.; E. A. Williams, Roseland, N. J., and others, whose names we will gladly furnish upon request. This line of business offers big returns by getting into the right territory. We will send upon request further information concerning methods of starting into this line of work.

### Every Municipality Can Use the Autocar Sprinkler

This car is designed to do the work of several horse-drawn sprinkler carts at a great saving of time and labor. The amount of water spread over the road is regulated by the driver by means of levers. One great advantage of this motor-sprinkler car is that it does not puddle the roads the way the slow-moving, horse-drawn vehicles do. It wets the ground thoroughly and traverses the route in less time than the horse-drawn vehicle. The following letter corroborates our claim that every municipality can use this type of sprinkler car, and realize an immediate and permanent saving over the old horse-drawn method.

CITY OF PENSACOLA, FLORIDA  
DEPARTMENT OF BOARD OF PUBLIC WORKS  
Mr. K. R. Vella, Bombay, India  
My Dear Sir:  
I wanted to tell you what our experience is with the automobile street sprinkler. We purchased an "AUTOCAR Street Sprinkler," at my suggestion to my Board, and with some question in their minds as to the practicability and the cost of upkeep. Previously we ran two 500-gallon, two-mule-team sprinklers, and did not run them much, as we usually had to be always careful not to overheat the mules. After a few experiments, I put the matter up before my Board, with the result of getting an "AUTOCAR," and after running for several months by one of my teamsters who had never ridden in a gas car without any adjusting, and with the mule team, I can tell you, we find the vehicle far beyond what we ever expected. It covers all the territory of the other wagons, and a great deal more, and the cost in running is so little in comparison, that we feel it has been a most judicious investment. I would also say, that besides this regular work, it is used many times at night on extra work, in sweeping and cleaning the streets. You would have no need in buying an "AUTOCAR" if it is work with a minimum cost you want. I am,

Very truly yours,  
(Signed) LOUIS DE M. BLOCKER,  
Chairman of the Board of Public Works

Write for Catalog No. 5-C.

**The Autocar Company—Ardmore, Pa.**

ESTABLISHED 1897

USED IN EVERY LINE OF BUSINESS



TYPE OF AUTOCAR OWNED BY SOUTHERN BOTTLING CO., BALTIMORE, MD.



ONE OF FIVE AUTOCARS OWNED BY PETER DOELGER

## Brewers and Bottlers Profit by Use of Autocars

A representative of the Peter Doelger concern made the following statement: "The point of information that must interest every business man is this: The exclusive use of motor trucks has decreased delivery costs almost 60 per cent; whereas it cost an average of 35 cents per barrel to deliver with horse and wagon, we are now delivering with motor trucks for about 15 cents per barrel."

### THIS UNSOLICITED LETTER TELLS THE AUTOCAR STORY.

#### SOUTHERN BOTTLING COMPANY

BALTIMORE, MD.

The Autocar Company  
Ardmore, Pa.

Gentlemen:

After careful consideration and minute examination, including demonstrations of other makes of trucks, we finally decided and selected the AUTOCAR as being the most substantial and economical truck that we could find. This truck has been used within the past six months in the place of three double teams, covering more territory in less time than our teams could accomplish. In addition, its cost of operation and maintenance is fully 25 per cent less. This saving could be increased considerably if our streets were in better condition. We consider ourselves fortunate in selecting the AUTOCAR, and heartily recommend same to any one in need of an exceptionally good commercial car. With sincere regards, we remain,

THE SOUTHERN BOTTLING COMPANY

AUTOCARS open up new fields to every industrial concern, by solving its delivery problems. One AUTOCAR averages six times more mileage than a horse-drawn vehicle. Now is the time to equip your delivery service with the *modern method* if you wish to hold your customers and secure your share of the general increase of business.

Write for book, "As Indispensable as the Telephone," and catalog will be included.

### The Autocar Company—Ardmore, Pa.

ESTABLISHED 1897

#### SALES AND SERVICE STATIONS:

PHILADELPHIA	NEW YORK	NEWARK	BOSTON	PROVIDENCE			
Atlanta	Baltimore	Buffalo	Chicago	Harrisburg	Lebanon	Los Angeles	Reading
Salt Lake City	San Francisco	San Juan	Scranton	St. Louis	Toronto		
Trenton	Washington	Wilmington		York			

MOTOR DELIVERY CAR SPECIALISTS

When Writing, Please Say—"Saw Your Ad. in the C C J"

# The Commercial Car Journal

VOLUME V

PHILADELPHIA, APRIL 15, 1913

NUMBER 2

## WINTER TRUCK SHOWS ABANDONED, BUT NO OTHER DATE SELECTED

At the April meetings of the N. A. A. M. and the Automobile Board of Trade, it was definitely decided to eliminate commercial cars from the national shows at New York and Chicago. It was also decided that the pleasure car shows will be held at the Coliseum, at Chicago, and Grand Central Palace, New York, Madison Square Garden being eliminated as a show building. No suggestions for a commercial car show were made.

At this meeting Alfred Reeves and S. D. Waldon resigned their membership from the executive committee of the N. A. A. M., and J. N. Gunn, General Manager of the Studebaker Corporation, and Alvan McCauley, General Manager of the Packard Motor Car Company, were elected to fill the vacancies. C. Arthur Benjamin was also elected to membership, as representative of the American Locomotive Company, succeeding H. S. Houpt. Messrs. Metzger, Chapin and Miles were appointed a committee to confer with the officers of the American Automobile Association and the Pennsylvania Motor Federation, to oppose adverse commercial vehicle legislation in Pennsylvania.

The N. A. A. M. has concluded arrangements with the Society of Automobile Engineers, whereby the two associations will work together in the investigation of the gasoline situation—the N. A. A. M. investigating the demand and supply, while the S. A. E. will make recommendations on the carburetion of kerosene and other low grade fuels, or some other substitute for gasoline.

## AUTOMOBILE MAKERS TO INVESTIGATE FUELS

### Offer Encouragement for Substitutes and Will Devote Special Attention to Carburetors Designed for Kerosene

At a conference with the Council of the S. A. E., held recently in New York City, a plan of action was sketched out by which the S. A. E. is given full authority to arrange for whatever scientific research the needs of the investigation may disclose. Such matters as may be of a purely commercial nature, naturally would fall more properly within the scope of the normal activities of the association itself.

While definite announcement of the details of the plan have not been made public, it is officially stated that it will embrace both fuels and carbureting devices. To whatever extent may be deemed necessary, the ground already covered by the Special Fuel Committee of the National Association will be gone over again in an effort to determine exactly the status of the petroleum industry, particularly with reference to reserve supplies of petroleum at present held under ground and the possibilities in the way of exploiting undeveloped oil fields.

Special opportunity will be given inventors and others who are interested in the development of new fuels as substitutes for gasoline to demonstrate not only their applicability to automobile propulsion, but also the extent to which they can be produced and the probable relative cost. In this connection

the investigators will study fuels such as the new motor spirits, recently placed on the market by the Standard Oil Company, of Indiana, and which is manufactured from a residue formerly marketed at a low price as fuel oil.

## NEW YORK'S PROPOSED WEIGHT-PER-INCH-OF-TIRE LICENSE SYSTEM

Borough President McAneny, of Manhattan, has introduced in the Board of Aldermen of New York City, a proposed ordinance which is attracting considerable attention on the part of the commercial car men.

The difficulty with the McAneny ordinance which makes it more difficult to handle, in some respects, than the flood of bills proposed for State enactment is that it is based on certain facts which do not admit of any accusation of venality or caprice or even partisanship. That recent development of trucking in New York has become a serious test of city pavements does not admit of denial, nor do motor truck men deny altogether that some regulation may be wise and prudent. The ordinance is the product of the city's best engineering talent and, so far as we know, represents an honest attempt to meet the situation effectively.

But it proposes measures of taxation so oppressive as to almost discourage the further extension of commercial car equipment on the part of any prudent "prospect." It neither prohibits the abuse of the streets nor protects them. It merely establishes a right to tear up the pavements upon payment of the required fee.

The proposed ordinance contains, among others, the following provisions:

- A—Vehicles using New York City streets must bear special licenses issued after weighing and paying the prescribed fees, which amount to the following:
  - 1—Loads in pounds per inch width of tire, 750 lbs. to 1000 lbs., \$1 to \$50.
  - 2—Additional fees to be charged for loads of 6000 lbs. to 10,000 lbs., \$75 to \$1000. Loads greater than 10,000 lbs. per wheel shall pay \$500 for each additional 1000 lbs.
  - 3—Vehicles from 6 ft. 6 in. wide to 9 ft. 6 in. wide shall be charged an additional \$5 to \$20.

Other provisions give details as to weighing, duplicate plates, violations, etc.

## TIRES REDUCED FIVE PER CENT

The principal tire manufacturers have made a reduction in the list price of tires amounting to about five per cent. on all sizes. The reduction went into effect the first of April.

## NEW YORK TRUCK PARADE SCHEDULED FOR MAY

The Motor Truck Parade for this Spring will probably not be held until May, as the weather in April during former parades has not been propitious. The first parade brought out 326 trucks, last year's 520, and it is hoped that this year will see at least 1000 trucks in line. The Motor Truck Club is now making active preparation for the event.

## CHICAGO CLUB TO HOLD COMMERCIAL CAR RUN

The Chicago Motor Club will hold a three-day commercial car reliability run. The first day there will be a trip to Aurora, Ill., and return; second day will be a trip to Gary, Ind., and return; the third day will be a trip to Evanston, Ill., and return through the loop district, then to the stock yards and return.

The dates for these trials have been set for April 28th, 29th, 30th, 1913. They will be divided into twelve divisions, as follows, and each division will be required to maintain a specified speed. The divisions and the speeds are as follows:

- 1-K under 1000 lbs., 12 m. p. h.
- 2-K 1001 to 1500 lbs., 12 m. p. h.
- 3-K 1501 to 2000 lbs., 11 m. p. h.
- 4-K 2001 to 3000 lbs., 10 m. p. h.
- 5-K 3001 to 4000 lbs., 10 m. p. h.
- 6-K 4001 to 5000 lbs., 10 m. p. h.
- 7-K 5001 to 6000 lbs., 9 m. p. h.
- 8-K 6001 to 8000 lbs., 9 m. p. h.
- 9-K 8001 to 10,000 lbs., 8 m. p. h.
- 10-K 10,001 to 12,000 lbs., 8 m. p. h.
- 11-K 12,001 to 16,000 lbs., 6 m. p. h.
- 12-K 16,001 to 20,000 lbs., 5 m. p. h.

The entrance fee is \$15 for the first car and \$10 for each additional car entered by the same manufacturer.

After checking in at night, the cars are to be garaged wherever the entrants desire. Each car must carry its catalog load in bags of sand or merchandise, in addition to all extra parts or supplies or personal baggage.

A driver's helper may be carried if desired. No passenger vehicles will be admitted.

The distance is approximately sixty miles for each day's trip. No more than three cars of any one make may be entered in any one division. The entries will close April 22nd, 1913. Entry should be made to J. P. Foraker, chairman of the committee in charge of the run, care of the Chicago Motor Club, Chicago, Ill.

## THE POST OFFICE DEPARTMENT NOW THE LARGEST BUYER OF COMMERCIAL CARS

The United States Post Office Department can now be said to be the largest buyer of commercial motor cars in the world, with the recent order given out by the department at Washington for over 100 machines. The departments in each of the large cities have also gone ahead and placed their orders for additional vehicles, so that the grand total of cars that will be bought by the department throughout the country during the year will break all records for purchases by one department, and it will be only a short time before the department will use commercial motor cars exclusively.

Another item that will count in favor of commercial cars is the fact that \$500,000 has been appropriated to the department for the improvement of the roads over which rural deliveries are made.

"Each state in the Union is to be allowed about \$8000 for the improvement of two post roads each year, with a reserve fund of about \$2000, to be spent annually in the maintenance of such roads. To avail themselves of the government cash, each state must expend twice these amounts in road building and maintenance, the work to be done under the supervision of local authorities."

## REDUCTION OF DUTIES ON CHASSIS AND PARTS MAY INCREASE FOREIGN IMPORTATION

In the new tariff, which the Democratic Party proposes to pass through Congress, there are a number of proposed changes in the duty on chassis and the various component parts of automobiles, which may result in the importation of considerable more foreign cars in the future, than has been the case in the past. While there is no reduction proposed in the duty on complete cars, the duties for the following parts, it will be noticed, have been reduced considerably.

	Old Tariff	New Tariff
Chassis	45%	30%
Finished parts except tires	45%	20%
Ball & Roller Bearings	45%	35%
Axles or parts	34c lb.	10%
Steel ingots & castings	7 to 40c lb. to 20%	10%
Steel or iron tubing	1 to 2c lb. to 30%	20%
Steel & iron forgings	30%	15%
Bolts	1 1/4c lb.	15%
Steel Rivets	45%	20%
Chains	7/8 to 3c lb.	20%
Aluminum	25%	7c lb.
Tires & other mfrd. rubber	35%	10%
Leather Goods	40 to 50%	30%
Magnetics	45%	20%
Machine Tools	45%	15%
Lamps	45%	20%
Wheel Hubs	20%	free
Leather	10%	free

As it is quite probable that the new tariff bill will pass with comparative few changes, unless there is a tremendous demand for a change, the American manufacturers will face renewed competition from abroad, where low wages is the rule.

## MERCHANTS' ASSOCIATION PROPOSES TRUCK MANUFACTURING FOR NEW YORK

The Merchants Association of New York, which includes some of the greatest of the city's business men, has decided that New York and vicinity offers special advantages to the manufacturer of trucks, and that properly guided a movement might be started and successfully carried through to establish New York as a large truck manufacturing center. The Industrial Committee recently invited a number of prominent automobile men to an informal dinner, followed by a discussion of the subject.

The general opinion after the discussion was that New York might easily become a practical automobile manufacturing center, the advantages possessed being greater than most had imagined.

A paper on the subject by Dr. E. E. Pratt, secretary of the Industrial Committee, gave valuable information. In this paper he compared the advantages of New York with those of Detroit; also pointed out that in Detroit there were numerous disadvantages owing directly to the tremendous concentration of automobile manufacturing at that place. The demand for skilled labor, he stated, was acute in Detroit, and that its cost per hour would undoubtedly reach 30 cents this summer; that Detroit has grown so rapidly that it is unprepared to cope with its new responsibility, street car lines being inadequate to carry the men to and from work; shortage of freight cars also handicapped the makers.

New York is the market for trucks, the statement being made that not less than fifty per cent., and even sixty-five per cent. of the commercial cars produced in the United States, are marketed and consumed in the territory within 100 miles of New York City.

## PERSONAL ITEMS

### C. ARTHUR BENJAMIN BECOMES SALES MANAGER OF ALCO



C. ARTHUR BENJAMIN

C. T. SCHAEFER, formerly chief engineer of the Palmer Meyer Motor Car Company, of St. Louis, Mo., has resigned.

F. P. CROCKETT has been appointed sales manager of the truck division of the Boston branch of the Locomobile Company of America.

W. B. MILLER, vice-president and director of the B. F. Goodrich Company, Akron, O., has resigned and D. M. Goodrich has been elected to fill his place.

EDMOND S. BABCOX, formerly with the Y. & E. Office Systems Company, has been appointed advertising manager of the Firestone Tire & Rubber Company.

JAMES E. CHALFANT, superintendent of the Hart-Kraft Motor Company, York, Pa., has resigned to accept a similar position with the Martin Carriage Works.

HAYDEN EAMES, one of the pioneers in the electric commercial car field has accepted a position as general manager of the Standard Electric Company, Jackson, Mich.

ELMER W. GRINNELL, Secretary and general manager of the Grinnell Electric Car Company, has assumed charge of the new commercial car department of that company.

C. R. HOYME has been appointed district supervisor of the American Locomotive Automobile Department for the middle west, making his headquarters in Cleveland, O.

JAMES G. SMITH, formerly connected with the Goodyear and Gibney Companies, has been appointed manager of the New York City branch of the Motz Tire & Rubber Company.

A. OTTO HEISTER, formerly with the United States Light & Heating Company, and the National Battery Company, has joined the sales force of the Edison Storage Battery Company, Orange, N. J.

JOHN A. GRAHAM, formerly with the Westfield Motor Truck Company, has been appointed district manager for the Sanford Motor Truck Company, of Syracuse, with headquarters in Boston, Mass.

KENNETH M. BLAKE, formerly manager of the Boston Branch of the Locomobile Company, has been appointed New York sales manager for the International Motor Company, makers of Saurer and Mack trucks.

C. O. SACKS, well-known manager of the Roland Advertising Agency, has accepted the position of advertising manager for Gray & Davis, makers of lamps and electric starting and lighting outfits, at Boston, Mass.

J. A. GARBER, Pittsburgh, Pa., formerly connected with the Thaw Automatic Steam Shovel Company, has been appointed sales manager of the truck department of the Locomobile Company of America, Pittsburgh branch.

F. S. SUMNER, who has been connected with a truck company in Boston, Mass., in the sales department for the last two years, has accepted a position in the truck department of the Whitten-Gilmore Company, Boston.

J. L. M. HOWE has resigned his position as assistant engineer of the electric truck department of the Studebaker Corporation, South Bend, for the purpose of joining a company in the manufacture of a light low priced commercial car.

E. L. SMITH, of Providence, R. I., formerly handling the Oldsmobile, is now connected with the New England branch of the R. & L. Company, Boston, distributor for Garford cars and trucks.

WILLIAM C. LITTLE, commonly known as "Bill Little," and who has been connected with the Lozier Motor Company, of Detroit, as special representative of the sales department, has severed his connection with that firm to accept the sales management of the Borland-Grannis Company.

EDGAR C. NEAL, until recently vice-president of the Buffalo Wholesale Hardware Company, has become identified with the Atterbury Motor Car Company, of that city. His official capacity with the Atterbury Motor Car Company will be announced after the next meeting of the directors of the company.

CHARLES W. CROSS has recently been appointed sales manager of the George H. Holly Brothers Company. Mr. Cross has been connected with the automobile industry directly and indirectly for the past fourteen years. Recently Mr. Cross has been associated with subsidiaries of the General Motors Company, during the past year occupying a prominent position in the selling department of the General Motors Truck Company.

R. D. CAMPBELL recently accepted the position of sales manager of the Mais Motor Truck Company, of Indianapolis. One of his first moves was the appointment of A. W. Cox & Company, of Cambridge, Mass., as New England agents, and the sale of a 3-ton truck to the Standard Oil Company, of Providence, R. I.; one to the Texas Oil Company, of Woonsocket, R. I., and a 1½-ton to Geo. Burett, of Fall River, and two 2-ton trucks to the U. S. Mill Supply Company, of Providence, R. I.

### A. A. A. SANCTIONS TRUCK RUN

The *Washington Post* Motor Truck Reliability Run, which will be held May 5 to 8, has been officially sanctioned by the American Automobile Association. T. B. Shoemaker, secretary of the contest board of the A. A. A., has been appointed referee. Meetings will be held every night during the run for the purpose of determining the day's scores and all meetings held prior to and after the run will be attended by the members of the general supply committee and the government experts.

## Factory Notes and Changes

**TOLEDO MOTOR TRUCK COMPANY**, of Toledo, O., is moving its plant to Moose Jaw, Saskatchewan, Canada.

**DELAHUNTY DYEING MACHINE COMPANY**, Pittston, Pa., have started to build commercial cars. Their first car is a 3000 lb. delivery, equipped with a four-cylinder Continental engine.

**OLD RELIABLE MOTOR TRUCK COMPANY** has leased two-story re-inforced concrete building now in course of construction on South Michigan Avenue, near Thirty-ninth Street, Chicago, Ill.

**GENERAL MOTORS TRUCK COMPANY**, Pontiac, Mich., has leased a property 100 x 135 ft., at Olive Street and Leffingwell Avenue, St. Louis, Mo., where a building will be erected for sales and service station.

**LORD BALTIMORE COMPANY**, Baltimore, Md., will build a factory 225 x 225 ft. adjoining the Baltimore & Ohio Railroad, just north of East Maiden Street, Washington, Pa. The building will be of steel and concrete, one story high, and will be thoroughly equipped for the making of motor trucks, in the manufacture of which the Lord Baltimore Company will engage exclusively.

**LOS ANGELES MOTOR TRUCK COMPANY** has purchased a thirty-acre tract of land at Bangle, on the lines of the Southern Pacific and Pacific Electric Railroads, about two miles from Wilmington, and are having plans prepared for the erection of a plant of five concrete buildings, which will represent the total investment of over \$300,000. The company has established offices in the Los Angeles Investment Building.

**MODEL GAS ENGINE WORKS**, Peru, Ind., has been merged with a new company to be known as the Pittsburgh Model Engine Company. The capital stock will be increased from \$250,000 to \$750,000. A large new plant is being built in Pittsburgh at Lexington Avenue and Pennsylvania Railroad, on a plot of five acres of ground. The new factory will be in operation by September 1st. The new company expects to devote its entire energies to the production of gasoline engines for pleasure and commercial cars and tractor engines. The plant at Peru, Ind., will be continued as before.

## New Branches

**AUTOCAR COMPANY**, Ardmore, Pa., has opened a branch in Washington, D. C.

**KELLY-SPRINGFIELD MOTOR TRUCK COMPANY**, Springfield, O., has established factory and service branches in New York, Boston, Chicago, Cleveland, Dallas, Seattle, etc.

**GENERAL MOTORS TRUCKS COMPANY**, Pontiac, Mich., will establish a factory branch and service station at Minneapolis, Minn., replacing the Robinson Motor Truck Company, who were formerly their agents at that point.

**STANDARD ROLLER BEARING COMPANY** will open an office in Indianapolis, Ind.; in charge of L. M. Watkins, Jr. This move was necessitated on account of the increasing demand for its annular ball bearings, taper roller bearings and other types of bearings, and steel, brass and bronze balls. The territory will cover that part of Indiana, including and south of Logansport, the southwestern part of Ohio, Illinois, south of a line east and west through Springfield, Tennessee and Kentucky.

## Incorporations and Capital Increases

**IVEY MOTOR TRUCK COMPANY** has been incorporated at Buffalo, N. Y., with \$10,000 capital. The directors are Chas. A. Ivey, A. L. Rustling and A. G. Heller.

**F. & P. AUTO TRANSPORTATION COMPANY**, Brooklyn, N. Y., has been incorporated with a capital stock of \$70,000 to manufacture and trade in vehicles propelled by electricity.

**DYNETO ELECTRIC COMPANY**, Elbridge, N. Y., will increase its capital stock from \$70,000 to \$350,000 for the purpose of extending its business in the manufacture of Dyneto lighting and starting systems.

**MOTOR COACH COMPANY, INCORPORATED**, Manhattan, N. Y., has been incorporated with a capital of \$500,000; autos, motor car hearses and burial coaches, by Sam Richenthal, Elbert R. Benyunes, Herman Miller, 501 West 124th Street, New York City.

**UNIVERSAL MOTOR TRUCK COMPANY**, of Detroit, has recently increased its capital stock to \$1,200,000. This amount has been fully paid in and makes the company one of the strongest financially in the country, engaged exclusively in the manufacture of motor trucks.

**THE EVANS MOTOR CAR COMPANY** has been organized at Nashville, Tenn., with \$50,000 capital, and will establish a plant near Madison Station, that city, on a tract of 108 acres, which has been bought by the new company. This company will succeed to the business formerly known as the Automobile Manufacturing & Engineering Company, of Traverse City, Mich., which had been organized by Mr. Evans.

**GRAND RAPIDS MOTOR TRUCK COMPANY**, Grand Rapids, Mich., has been merged with the Michigan Hearse and Carriage Company of the same town. The name of the new company will be the Michigan Hearse & Automobile Company. The new company will be capitalized at \$600,000, \$250,000 of which is preferred, and \$350,000 is common. The plants occupied by both companies will probably be continued in operation, and motor hearses will be added to the product.

**ROCHESTER-MAIS COMMERCIAL CAR COMPANY**, Rochester, Ind., has been organized for the purpose of building 1500 and 2500-lb. trucks, and plans are being made for a factory building. All cars will be built of the internal gear type. The cars will be designed by John A. Mais, who is a younger brother of A. F. Mais, formerly of the Mais Motor Truck Company, and now with the Studebaker Corporation. The directors of the company are A. C. Davison, J. M. Ott, R. P. True, Earl Miller and J. M. Mais.

## SPLITDORF ESTABLISHES EUROPEAN STATION

O. J. Rohde, treasurer and manager of the Splitdorf Electrical Company, of New York, has returned from a very successful trip abroad, where he went in the interest of the parent company to establish an up-to-date European branch and service station for the convenience of users of Splitdorf ignition.

The location decided upon was at 6 City Road, Finsbury Square, London, E. C., and Mr. Rohde arranged for the installation of every device for testing and repairing ignition outfits and the carrying of a full line of spare parts, magneto, coils, spark plugs and other products of the Splitdorf Electrical Company.

# THE PUBLISHERS PERSONAL PAGE

*"Necessity sharpens industry"*

## Commercial Cars to the Rescue

Few people realize the remarkable work of rescue that was carried on in the recently flooded sections of Ohio and Indiana by automobiles and trucks. Almost immediately the street cars, electric lighting plants, pumping stations, etc., were put out of commission. Automobiles and trucks were operated through the flooded districts, even with water over the axles, and carried on the work of relief.

For several days and nights the test cars and trucks of practically all the automobile factories within the flooded zone were freely given for the work of rescue. These cars carried provisions and militia to the points of danger, and transported nurses and physicians, with great speed, at a time when there was no other means of transportation, and made it possible for newspaper men to get the details, and make known to the rest of the country the urgent need for help. The cars carried the injured, and rescued sufferers, rushing them to hospitals and private homes where they could be cared for. Small towns, cut off entirely from all communication, were reached over almost impassable, inundated roads.

Automobile fire trucks, it is claimed, saved Indianapolis several times from burning. The water and gas supply was almost immediately shut off owing to the flood, and the pumping stations were silenced, but the motor

fire trucks reached the scenes of the fires so rapidly that incipient fires were put out before a conflagration started.

The relief cars were supplied with Red Cross badges, and the work of rescue and relief was pushed at the utmost speed. It is interesting to note that not one of the 'buses which

were kept in operation in this manner.

The novel sight of trucks loaded with boats plowing their way through sheets of water to get to those who were cut off from rescuers was to be seen, and trucks carrying their loads of rescued to higher ground and safety, in fact the loss of life would have been very much greater, if it had not been for the prompt and hearty co-operation of the automobile and tractor makers, not only in the flooded districts, for many of them were placed at a disadvantage, but by the large companies in other cities, who immediately shipped large numbers of trucks to the flooded section.

## Trucks Removed Dead Animals

One of the most efficient services rendered by the power-driven vehicles was the prompt removal from the streets, of large numbers of dead horses and other animals. In Dayton alone, commercial cars removed in one week over

charged high fares were owned by automobile makers, but the services of their cars were given free.

Even the daily newspapers could not have been published in some of the towns if it had not been for the engines of automobile tractors which were rushed to the scene, blocked up, and belted through the windows to the idle presses. Pumping stations were operated in the same manner, and electric lights were furnished to entire sections by power from the motors of automobiles and tractors. Even telephone plants

one thousand dead animals, to say nothing of hundreds of tons of debris and rubbish. The efficient service of the trucks in removing dead animals and other refuse matter undoubtedly prevented an epidemic. They also carried provisions and supplies for one hundred thousand people.

The progress made by motor-driven vehicles was never more forcibly demonstrated than at this time, proving beyond doubt that they form to-day one of the most dependable and reliable methods of transportation known.

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## Conventions of Interest to the Trade

April 17-18—Laundry Owners' Association of Kentucky will hold convention at Lexington, Ky. G. T. Graves, of Lexington, is on Executive Committee.

April 21-23—Mississippi Electric Association will hold convention at Natchez, Miss.

April 22-24—Retail Merchants' Association will hold State Convention at Alton, Ill. W. Carterson, Moline, Ill., is interested.

April 23-May 3—Merchants' Association will hold Merchants' Week, at Burlington, Vt. F. C. Lyon is on Publicity Committee.

April 23—Arkansas State Automobile Association will hold Convention at Little Rock. Little Rock Board of Trade.

April 24—Convention of Iowa State Electrical Association, Waterloo, Ia. H. B. Maynard, Secretary.

May—National Lumber Manufacturers' Association, Kansas City, Mo. Annual Meeting.

May 5-6—New Jersey State Building Trades Council will hold convention at Wildwood, N. J.

May 6-8—Southern Hardware Jobbers' Association will hold convention at Mobile, Ala. J. Donnan, Richmond, Va., Secretary.

May 6-8—Wholesale Liquor Dealers' Association of America will hold annual convention at Hotel Seelbach, Louisville, Ky. B. Bernheim on committee.

May 13-15—Florida Funeral Directors' and Embalmers' Association will hold convention at Jacksonville, Fla.

May 13-15—Arkansas Retail Hardware Association will have exhibit and convention at Little Rock. G. T. Owens, Little Rock, Secretary.

May 13-15—Illinois Bakers' Association will hold convention at Rock Island with headquarters at Hotel Harms.

May 14—State Wholesale Grocers' Association will hold convention at Grafton, W. Va. W. C. McConaughay, Parkersburg, W. Va., president.

May 14-16—Southern Wholesale Grocers' Association will hold convention at Charlotte, N. C. C. C. Hook, Charlotte, President.

May 14-17—Convention of Southern Oregon and Northern California Mining Congress, Redding, Cal.

May 15-16—National Machine Tool Builders' Association will hold convention at Hotel Astor, New York City.

May 19-20—Convention of Arkansas Engineering Society, Little Rock, Ark.

May 19-22—Convention of National Association of Retail Grocers, St. Louis, Mo. C. H. Kraas, Chairman.

May 20-22—South Dakota Retail Merchants' and Hardware Dealers' Association will hold convention at Redfield.

May 20-22—New Mexico Retailers' Annual Convention at Roswell.

May 24-June 1—Industrial Exposition at Yonkers, N. Y. Yonkers Merchants' Association.

May 26-28—Electrical Supply Jobbers' Association will hold convention at Chicago, Ill.

The list of conventions given herewith is published each month so that commercial car manufacturers can communicate with the proper authorities with the idea of arranging to give lectures, illustrated talks, statistics, etc., to show the advantage of motor trucks in these various lines; also possibly to show and demonstrate their cars.

July 10—National Electrical Contractors' Association will hold convention at Chattanooga, Tenn.

July 21-24—Convention of National Cleaners' and Dyers' Association of the United States, and Canada, Omaha, Neb. Rome Hotel.

July 21-26—North Dakota State Fair, Grand Forks, N. D.

July 22-25—Iowa State Firemen's Association will hold convention at Perry, Ia. Chief Dan Flanigan, Perry, Ia., in charge.

July 24-26—Ohio Builders' Supply Association will hold convention at Cedar Point, Ohio.

August—Retail Merchants' Association of Pennsylvania, will hold convention at Warren, Pa. J. W. Kendall, Chairman.

August—Cotton Carnival, Galveston, Tex. Galveston Commercial Association, F. M. Lege, Jr., Chairman.

August 11-13—Wisconsin Retail Grocers' and General Merchants' Association will hold convention at Racine.

August 14-16—National Electric Lighting Association will hold convention at Macon, Ga. W. L. Southwell, of Macon, is Chairman of Executive Committee.

August 18—American Florists' and Ornamental Horticulturists' Society will hold convention at Minneapolis, Minn. J. K. M. L. Farquhar, of Boston, Mass., is President.

September 1-6—Fire Chiefs' Association will hold 41st annual convention in New York City. Exhibits will be housed at Madison Square Garden. James McFall, Secretary, Roanoke, Va.

September 3-13—Retail Grocers' Association Show, San Jose, Cal. A. F. Emlay, Secretary.

October—Convention of International Dry Farming Congress, Tulsa, Okla.

October—National Hardware Jobbers' Association will hold convention in Denver, Colo.

October 4-11—Electrical and Industrial Exposition will be held in Denver, Colo., by the Colorado Electrical Club. L. M. Cargo, 1052 Gas & Electric Bldg., is chairman of committee.

October 13-19—American Foundrymen's Association will hold convention at La Salle Hotel, Chicago, Ill.

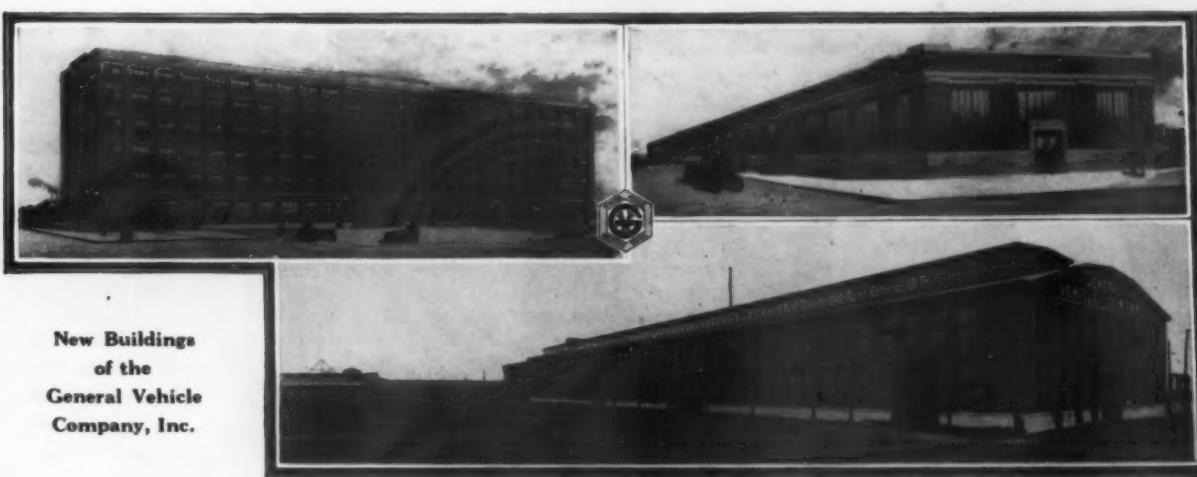
October 14-16—Grain Dealers' National Association will hold convention at New Orleans, La.

October 20-26—Georgia State Fair. M. V. Calvin, Secretary, Macon, Ga.

October 21-24—Wichita (Kan.) Business Men's Association preparing for Trans-Mississippi Congress, to be held in Wichita.

December 10-12—Wisconsin Retail Implement and Vehicle Dealers' Association will hold convention at Milwaukee, Wis. G. F. Borchardt, South Milwaukee, Wis., President.

February 9-14 (1914)—Retail Hardware Association of Maryland, Pennsylvania, Delaware and New Jersey will hold convention at Baltimore, Md. W. P. Lewis, Huntingdon, Pa., is Secretary.



New Buildings  
of the  
General Vehicle  
Company, Inc.

The two upper illustrations show new factories which the General Vehicle Company, Inc., is adding to its present plant equipment, to take care of the steady increase in its electric truck business. The one on the left shows the six-story, 500 x 75 ft. electric vehicle plant, which will cost, without tools, at least \$500,000. The sixth floor will be reserved for the general offices of the Company. Two passenger and two freight elevators will be installed. The Electrical Division will be moved into the new six-story building, while the old plant (see lower illustration) will be remodeled so as to provide machine shops and assembly plants for Mercedes trucks. The picture at the right of the six-story building shows a 50 x 240 ft. plant, which will be devoted entirely to gasoline truck production.

# THE COMMERCIAL CAR JOURNAL

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Known bondholders, mortgagees, and other security holders, holding one per cent or more of total amount of bonds, mortgages, or other securities: NONE.

(Signed) C. A. MUSSelman, Business Manager.

Sworn to and subscribed before me this 13th day of March, 1913.

(Signed) HARRY SMITH, Notary Public.  
(My commission expires February 21, 1915.)

Note:—In regard to Section 2 of the Act mentioned above, the Chilton Company does not accept payment, directly or indirectly, for any editorial or other matter printed as news.

## DO THE MANUFACTURERS WANT A SPECIAL AUTOMOBILE BUILDING AT THE 1915 PANAMA EXPOSITION?



THE Panama-Pacific International Exposition management is greatly disappointed because the National Association of Automobile Manufacturers was not successful in putting through the proposition of erecting a special building for automobiles at the forthcoming exposition of 1915. Arrangements had been made to set aside sufficient space to put up the magnificent building shown in our February number, provided a sufficient amount of exhibition space should be subscribed for by the motor car manufacturers.

The N. A. A. M. recently advised the exposition management that commitments could not be secured for space two years in advance of the opening of the exposition. The exposition management is now making an appeal to the automobile manufacturers direct, and states that if sufficient support is forthcoming within the next two or three weeks, that the special building, to cover a space of 210,000 sq. ft. can yet be erected.

The terms under which the exhibition space is sold are \$2.00 per sq. ft., 25 per cent. to be paid on the signing of the contract, 25 per cent. on or before January 1st, 1914, and the remaining 50 per cent. when the building is turned over to the exhibitors.

Should the automobile building not be built, the only space available for motor cars would be in the Transportation building, whose total area is 235,000 sq. ft., a great majority of which has already been apportioned to international transportation exhibits, and many manufacturers would no doubt be unable to secure the space they wanted.

The management of the exposition feels that the American automobile manufacturers do not appreciate the advantage that they are losing in not having a special building of their own, and that the cost would be considerably less, as the charge for some of the spaces in the Exposition is as high as \$5.00 per sq. ft. All manufacturers who wish to support the special building should write at once to the Exposition management, at San Francisco, Cal.

**NOW IS THE TIME**

At present, out of twenty advertisements of carburetors, about eighteen mention the large percentage of saving due to their use. This saving ranges from 15 to 50 per cent., averaging about one-third. It is noticeable that the saving over what—the worst or the best, is not stated. All this, however, points to one conclusion—the user is demanding a reduction in his fuel costs, and this is particularly true of truck users.

Manufacturers and agents should take notice. Fuel consumption, fuel economy and fuel costs are to play an important role in the selling act in the future. Mixtures of gasoline and kerosene, the new lower grade fuel "motor spirit," or straight kerosene can be successfully used, if preparation is made for its use by the carburetor and engine makers. Now is the time to get busy and provide, not makeshifts, but carefully designed carburetors, vaporizers, heated manifolds, etc., which will care for the lower grade fuel oils—76 test gasoline is a thing of the past.

## COMMERCIAL CAR SHOWS!

"To be or not to be, that is the question"



THE present situation in regard to commercial car shows is, to say the least, extremely unsatisfactory. There is nothing definite scheduled for the coming year. At the March meeting of the N. A. A. M. the Show Committee placed itself on record by opposing the continuance of commercial vehicle shows. At the April meeting it was definitely decided that Commercial Car Show Week would not be a feature of either the New York or Chicago Shows this coming winter. For these shows the new Grand Central Palace and the Coliseum will be used.

For some time we have been advocating a large national combined outdoor and indoor truck show, to be held at some central point, where mechanical devices and competitive hauling events could be conducted, preferably in the fall, at a time when all dealers could be present and meet the manufacturing interests. The action of the N. A. A. M. and Automobile Board of Trade in cutting off the commercial car shows from the mid-winter pleasure car shows, throws the matter open, and makes possible this big National Annual Truck Show, which we are advocating, but some action should be taken in this matter without delay, in order that the first of such exhibits shall be a great success.

The action of the National Association stopped with the cutting off of the shows, but did not mention any plans whatever for the future, and it is to be hoped that this will be taken care of at the next meeting, as the uncertain and indefinite state in which the matter now stands is not good for the industry.

In view of the growth of the commercial car industry, we felt the time might be here for a separate and independent organization of commercial car makers. To ascertain the feeling of the manufacturers on this subject, we sent out a letter suggesting the advisability of forming such a commercial car makers' association. From the numerous answers received by us to this letter, it is evident that there is a diversity of opinion on the subject. Those manufacturing commercial cars exclusively, are decidedly in favor of a separate association, while those who manufacture both pleasure and commercial cars are evidently satisfied to have the commercial car interests handled by the same body that supervises the pleasure car industry. According to the N. A. A. M., however, as shown by the letter herewith reproduced, the feeling of the makers is unanimously against a separate organization.

New York, April 4th, 1913.

Commercial Car Journal,  
49th & Market Sts.,  
Philadelphia, Pa.

Gentlemen:—

At a meeting of this association held on Wednesday, attention was called by some of our members to a letter written by you on March 13th relative to the formation of a separate organization of commercial car makers. I am instructed to advise you that, inasmuch as the makers of commercial cars believe that the interests of the trades can be best served by a single organization and that the interest of commercial car makers are already well represented, the association does not look with favor on a proposal to form a separate organization, and especially a proposal emanating from a source other than a manufacturer.

Very truly yours,  
National Association of Auto. Mfrs., Inc.  
S. A. MILES, General Manager.

Whatever the decision in this matter, it is certain that some definite action should be taken as soon as possible, and

all indications point to the advisability of an enormous outdoor demonstration of commercial cars this coming fall, whether a separate commercial car organization is formed or not.

## Steel and Rubber Markets

## Steel Market Still Active and Prices Firm

The steel mills are still running at top speed and do not seem to be catching up with orders to any appreciable extent. The demand is active and the market is consequently firm, remaining approximately the same as last month. Quotations of April 11th were:

Bessemer steel, per ton, mill	29 00	a 29 50
Open hearth, per ton, mill	29 00	a 30 00
Sheet bars, per ton	30 00	a 31 00

## STEEL BARS

Steel, soft base, half ex., tidewater ..... 1 56 a 1 61  
The above prices are at tidewater in carloads and larger lots. For quantities less than 2,000 lbs., but not under 1,000 lbs. \$2 00 per ton additional is charged and less than 1,000 lbs., \$8 00 per ton additional.

## SHEETS

The following prices are for 100-bundle lots and over f. o. b. mill; smaller lots \$2 00 per ton higher.

Gauge—	Black	Galv.	Gauge—	Black	Galv.
Nos. 22 & 24	2 20	3 15	No. 28	2 35	3 50
Nos. 25 & 26	2 25	3 25	No. 29	2 40	3 70
No. 27	2 35	3 35	No. 30	2 45	3 90

## IRON AND STEEL AT PITTSBURGH

Bessemer iron	18 15	a	...
Bessemer steel, f. o. b. Pitts.	29 00	a 30 00	
Muck bars	31 00	a	
Skelp, grooved steel	1 45	a 1 50	
Skelp, grooved iron	1 75	a 1 80	
Ferro-manganese (80 per cent.) seaboard	64 00	a 65 00	
Steel, melting scrap	14 25	a 14 50	
Steel bars	1 40	a 1 45	
Black sheets, 28-gauge	2 35	a	...
Galvanized sheets, 28-gauge	3 50	a	...
Blue annealed, 10-gauge	3 50	a	...
Tank plates, 3/4-inch and heavier	1 45	a 1 50	
Wire rods	30 00	a 31 00	
Wire nails	1 80	a	...
Plain wire	1 60	a	...
Cut nails	1 75	a 1 80	
Barbed wire, painted	1 75	a	...

## Rubber Reaches 78 Cents

The price of crude rubber is steadily declining due to the increased production, the net reduction for the past month being 16c a lb., more than the decline for any previous 30 days. It is to be expected, however, that bottom prices will soon be reached, as producers will undoubtedly hold back shipments for a better market and consumption is steadily increasing. It is doubtful, however, whether rubber will ever again reach the old high prices. Quotations on April 11th were:

<b>Up-River—</b>	<b>Africans—</b>
Fine	Massal red ..... 77 a 78
Coarse	Red C'go ..... Nominal
<b>Island Fine—</b>	B'k C'go. ..... 76 a 77
Coarse	38 a 39
Cameta	39 a 40
<b>Caucho—</b>	<b>Soudan—</b>
Ball	Niggers ..... Nominal
Corinto	Accra, lb. ..... 38 a 39
Esmeralda	Gambia, prime ..... 53 a 54
Guatemala,	
slab	Smk sh'ts ..... 80 a 81
	Ceylon, bls. and Sh'ts ..... 79 a 80
	Pale crepe ..... 82 a 83
	Borneo I ..... 36 a 37
	Borneo II ..... 45 a 46
	Borneo III ..... 37 a 38
<b>Mexican—</b>	<b>Pontianacs—</b>
Scrap	Pontianac, Prime plantation ..... 8 a ..
Strips and scrap	Palembang ..... 7 a ..
Guayule	
Balata, sh't	LONDON, April 11.—Closing: Up-river fine, 38 4 1/2d; up-river coarse, 28 3 3/4d; pale crepe, 38 3 3/4d, basis first latex. Prices are for spot and nearby. Market closed quiet but steady.
Ciudad, b'k	
Trinidad, b'k	

**SCRAP RUBBER—DOMESTIC**

<b>Tires—</b>	10 a	10 1/2
Automobile	5 1/2 a	5 1/2
Bicycle, pneumatic	9 1/2 a	9 1/2
Wagon and carriage, solid	17 1/2 a	17 1/2
Hose, steam, fire		

## N. A. A. M. ESTIMATE OF COMMERCIAL CAR PRODUCTION

The National Association of Automobile Manufacturers has just announced the result of a census which it has made of the output of commercial cars in the United States. In this census the figures for the product of 170 companies for the year 1913 total 51,586 vehicles.

In the November, 1912, issue of the COMMERCIAL CAR JOURNAL, we give the estimated output of 341 makers of commercial cars as 89,055. These figures are probably high, but we do not believe that they are as much too high as the estimate of the N. A. A. M. would indicate. As an indication of the fact that the N. A. A. M. figures are rather low, we would say that the Association gave the output for the year 1912 as 21,939, whereas our figures for the year 1912 were a trifle over 40,000, and those figures have been shown to be fairly accurate. The N. A. A. M. figured the same 170 makers in 1912 as in 1913. Our figures for 1912 included only 275 makers, whereas there are more than 340 this year, 170 of whom the N. A. A. M. does not take into account in estimating the output. We believe that 35,000 for 1912, and from 75,000 to 80,000 for 1913 is as nearly correct as it is possible to estimate, although the indications are that 1913 will be a tremendous year in the manufacture of commercial cars. New makers are entering the field every week. We herewith give the N. A. A. M. figures of April 10th.

The total output of commercial cars of all kinds and types reported for the year 1912 by 170 companies was 21,939, as compared with a total of 10,655 reported for the year 1911 by 85 companies, and 10,374 reported for all preceding years combined up to the end of 1910 by the same 85 companies. It is believed these companies represented about 75 per cent. of the total production of the country, while the 170 companies reporting for 1912 and 1913 probably represent about 90 per cent. of the total output.

The estimated production for the year 1913 is 51,586 vehicles.

The figures given show that each year's output closely approximates the total output of all preceding years combined, thus:

Reported output prior to 1911	10,374 plus 25% =	12,968
Reported output during 1911	10,655 plus 25% =	13,319
		26,287
Reported output during 1912	21,939 plus 10% =	24,133
		50,420
Estimated output during 1913	51,586 plus 10% =	56,744

This is a rate of growth of approximately 200 per cent. annually.

The data furnished in the reports provide a valuable index of the growth and trend of the motor truck industry. Some makers may be disappointed in their expectations for the present year, but on the whole the estimates of production for 1913 are believed to be fairly conservative, as nothing was to be gained by any manufacturer in exaggerating his figures, because the census was a secret one in which names of companies were not to be attached to the reports.

### Output and Valuation of Different Classes of Commercial Cars

Reported by 170 companies in February and March, 1913.

	1912		1913	
	No. Cars	Aggregate Value	No. Cars	Aggregate Value
Gasoline Vehicles	20,052	\$37,474,308	44,245	\$83,073,200
Same, value estimated*	100	162,357	1,775	2,620,847
Fire Apparatus	140	843,900	232	1,422,250
Same, value estimated*	135	813,760	260	1,595,200
Gasoline Tricars	58	23,610	1,500	662,500
Gasoline Tractors	42	122,500	900	2,125,000
Electric Vehicles	1,351	3,330,568	2,736	6,627,750
Mixed Systems	59	163,800	25	108,125
Steam Vehicles	2	8,025	13	54,000
Grand Totals	21,939	\$42,942,828	51,586	\$98,288,872

\*Production reported with no values given; values calculated on average prices of other vehicles of same kind and capacity.

### Output of Commercial Cars Compared by Years

	Reported by 85 Companies		Reported by 117 Companies	
	Sold prior to 1911	Sold in 1911	Made in 1912	Output for 1913
Gas Vehicles	10,230	10,451	20,528	48,867
Electric Vehicles	144	204	1,351	2,736

### Average Prices of Commercial Cars Compared by Years

	Prior to 1911	During 1911	During 1912	For 1913
Gas Vehicles	\$1955.70	\$2079.16	\$1868.95	\$1877.57
Electric Vehicles	3369.72	2759.66	2465.18	2422.44

## PENNSYLVANIA FOLLOWS NEW YORK IN ATTEMPTING TO RAISE LICENSE FEES

There have been several bills introduced into the Pennsylvania Legislature which are similar to those introduced in the New York State Legislature, increasing the license fees and restricting the weight of commercial cars. The Pennsylvania Buckman bill requires the following fees:

2 ton and under cars	.....	\$10.00
2 to 2½ ton cars	.....	15.00
2½ to 5 ton cars	.....	20.00
5 to 7½ ton cars	.....	25.00
7½ to 10 ton cars	.....	30.00

Other bills call for still higher fees, and still others limit the total weight of car and load to 10 ton, of which not more than 75 per cent. can be carried on one axle. The Pennsylvania Motor Federation and the N. A. A. M. have combined their efforts with those of the local association to defeat these bills.

## AUTOCAR COMPANY ENTERTAINS

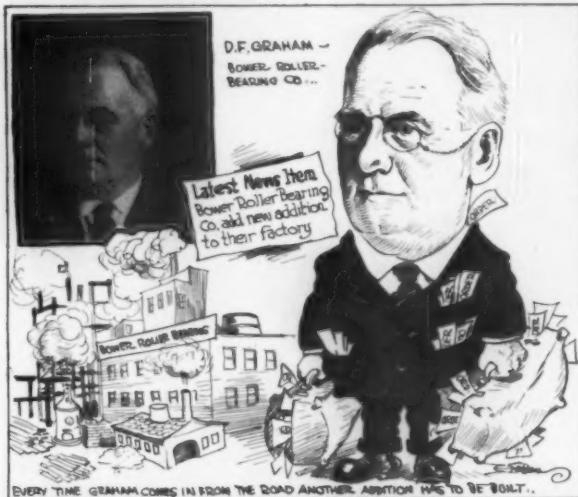
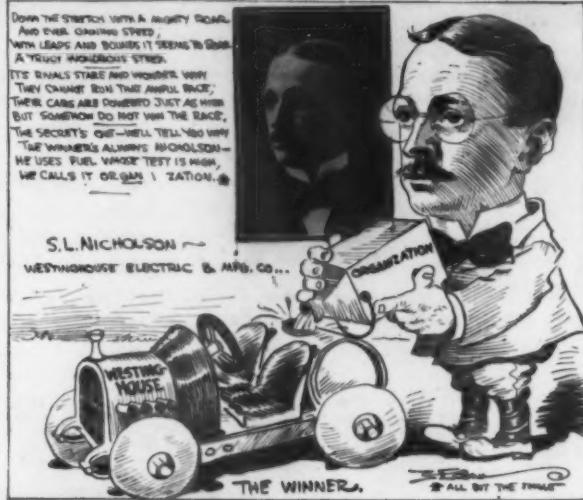
The Autocar Sales and Service Company, on April 8th, held an informal entertainment at its Philadelphia sales-rooms, which was particularly interesting, on account of its instructive nature. L. C. Carlton, of the Bosch Magneto Company, gave an illustrated talk on "Principle and Construction of Magnetonos as Applied to Gas Engines," and R. F. O'Brien, of the Goodyear Tire and Rubber Company, spoke on "Motor Truck Tires."

**MOTOR AND ACCESSORY MANUFACTURERS**, New York City, report the following concerns elected to membership: William H. Brown, Cleveland, O., manufacturer of time clocks (trade name "Travelog"); Fedders Manufacturing Works, 57 Tawanda Street, Buffalo, N. Y., manufacturers of automobile radiators, and National Lead Company, 111 Broadway, New York City, manufacturers of lead products, linseed oil, white metal alloys and die castings.

**THE KELLY-SPRINGFIELD MOTOR TRUCK COMPANY**, of Springfield, O., advises us that its factory was in no way damaged by the floods which have swept over southern Ohio and Indiana. Railroad service has, however, been seriously hampered and it will be sometime before this company will be able to receive shipments of material or deliver trucks.

**MAXWELL MOTOR CAR COMPANY**, Detroit, Mich. It is rumored that the Maxwell Motor Car Company has put out some tentative inquiries in New York City for machine tools to be used in refitting the old Brush plant in Detroit. It is understood commercial trucks will be manufactured.

# CCJ GALLERY of SALES MANAGERS





## New Agencies and Service Stations

WRIGHT, Geo. H., Greenfield, Mass., has the agency for the Standard truck.

DILL, L. W., Harrisburg, Pa., has taken the agency for Lippard-Stewart trucks.

SALES MOTOR COMPANY, Elm Grove, W. Va., has secured the agency for the Vulcan.

HOLMES, G. E., 1502 Michigan Avenue, Chicago, Ill., has taken the agency for the Chase truck.

SMITH & HEBERLE, 199 West Sixth Street, St. Paul, Minn., has taken the agency for the Dart truck.

JACKSON, A. J., 571 South Clinton Street, Syracuse, N. Y., has taken the agency for Federal trucks.

SCOTT, C. B. COMPANY, Franklin Avenue, Scranton, Pa., has the agency for White trucks.

LIBERTY GARAGE, 58 Liberty Street, Springfield, Mass., has taken the agency for the Koehler truck.

KING-MCDONALD COMPANY, 2810 M Street, Sacramento, Cal., has taken the agency for Kelly-Springfield trucks.

RUCH, ROBT. and LLOYD TAYLOR, Seventh and Gordon Streets, Allentown, Pa., have the agency for the Mack trucks.

KEHEW, GEO. F., 239-43 Massachusetts Avenue, Cambridge, Mass., has taken the agency for the Mercury truck.

COLE SALES COMPANY, 1020 Morton Street, Baltimore, Md., have secured the agency for the Gramm commercial car.

SWANSON MOTOR CAR COMPANY, 5548 Wentworth Avenue, Chicago, Ill., has the agency for the Koehler light commercial car.

FRUIT-OHL COMPANY, Sharon, Pa., has the agency in Mercer, Lawrence and Butler Counties for the Vulcan and Little Giant trucks.

LEAVITT, J. W. & Co., San Francisco, Cal., has taken the agency for Gramm commercial and Garford pleasure and commercial cars.

BROOK GARAGE, INCORPORATED, Trenton, N. J., has the agency for the Autocar commercial cars. A full line of auto parts will be carried.

EASTERN MOTOR CAR COMPANY, Olive Street, Los Angeles, Cal., has taken the agency for the Universal truck. Mr. Kirkwood is manager.

CRAMER, J. A., 734-41 Main Street, Buffalo, N. Y., has added a motor truck department to his establishment, and has secured as manager for the truck department E. E. Denniston.

BARGER, W. H. COMPANY, 1730 Euclid Avenue, Cleveland, O., agent for the Rambler, will handle the three styles of commercial vehicles being built by the Thos. B. Jeffery Company.

ENTZ AUTOMOBILE & BATTERY COMPANY, a new concern, making a specialty of the storage of electric trucks, has leased space in the building on north side of Chestnut, west of Nineteenth Street, St. Louis, Mo.

GENERAL MOTORS TRUCK COMPANY, 1121 Locust Street, St. Louis, Mo., has leased building being erected at 2807 Olive Street. It will be used as a display and salesroom, and cost \$25,000. A lot 100 x 135 ft. will be covered.

LANGFORD, BACON & MYERS, Automobile Row, San Francisco, have taken the agency for the Lauth-Juergens commercial car. The company will retain its offices downtown, but will exhibit the trucks in A. J. Smith's old location on Golden Gate Avenue.

ABRAMS, F. C., San Diego, agent for Rambler pleasure cars and Chase trucks, has opened a service station in rear of salesroom. C. N. Gillette, an expert mechanic from the Chase Motor Truck Company, is in charge of the service, which will be given to Chase trucks.

BRADY-MURRAY CORPORATION, 30 Church Street, New York City, eastern distributor of Smith and Maccarr gasoline trucks, Lansden electric trucks and Chandler pleasure cars, has been incorporated under the laws of New York. The company maintains a service station at 225 West Fifty-seventh Street, and a retail salesroom on Broadway, under the management of R. J. Laciari, assistant general sales manager. Arthur C. Brady is president of the company, Arthur T. Murray, vice-president and sales manager, and J. M. Breitenbach, secretary, treasurer and service manager.

## ALCO ESTABLISHES BRANCH IN PHILADELPHIA

C. Arthur Benjamin, general sales manager of the American Locomotive Company, automobile department, has announced the establishment of an Alco branch in Philadelphia, with T. J. Megear as branch manager and F. von A. Cabeen, Jr., as sales manager.

The branch, which is located at 2126-30 Market Street, the new automobile row in Philadelphia, supersedes the Longstreth Motor Car Company, which formerly handled the sales distribution of the Alco line in the Philadelphia territory. The building is of concrete with terra cotta frontage and was erected at a cost of \$150,000.



MR. T. J. MEGEAR

## THE ABUSE OF THE MOTOR TRUCK OVERLOADING AND OVERSPEEDING

By CHAS. H. SPENCER, of the Autocar Company



INVESTIGATION will come close to proving in every case of a high-grade truck failing to give satisfaction, that it has been improperly handled. The large corporations who run trucks in numbers have comparatively little trouble, not alone because they are able to employ confident garage men, but because their machines are protected in their regular round of work. Riding rules indict over-speeding and over-loading is prevented at the loading platform, yet the garage superintendent will not permit to be placed on the truck several hundred pounds more than its maker has named as a maximum load the car should carry. Under these conditions of careful handling the trucks give long and reliable service.

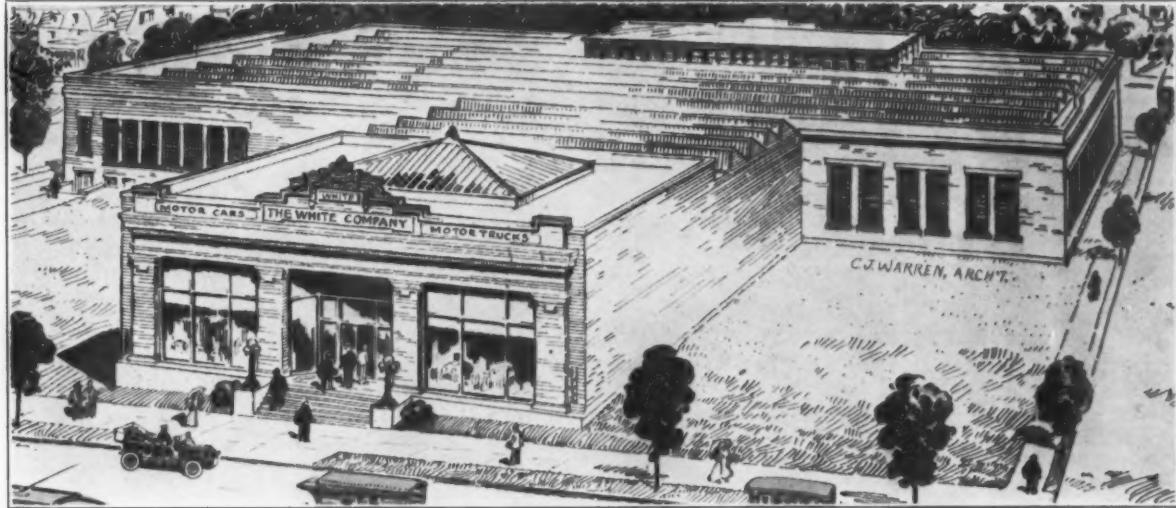
Of all the abuses inflicted on the motor truck by the ignorant, indifferent, and careless driver, and sometimes the owner, over-loading has the worst effects. It is very difficult for the manufacturer of the car to guard against this evil. The purchaser of a motor truck has been convinced through the efforts of motor truck salesmen that a great number of horses will be put out of business, at the moment the truck is introduced into delivery service. The horses could complain by collapse when overwhelmed with too big a task, but the motor truck has no means of protest, until the damage is done, and the purchaser of the truck is determined to get results. He retires his horses, and puts his truck through a course of service far beyond its capacity; over-loading and over-speeding are the first evidences of abuse. The truck gradually becomes less efficient, then some day under an over-load strain, something gives way, the car stops, the owner registers a stern complaint, yet he has no just redress; he himself in his cupidity has ruined the fine

piece of mechanism handed him by the maker, and to him alone should fall all the burden of restoring it to a working condition again.

A few months ago, in Philadelphia, a paramount case of over-loading brought its penalty in the breakdown of a high-grade truck. This vehicle whose reputation is nation-wide, and whose service in some of the biggest firms in the United States has demonstrated its high quality and reliability, has a load capacity of five tons. The owner put ten tons on it. The axle bent, the car stopped, the over-load had done its disastrous work. Immediately there was a hurry-up call to the local agent; he sent a good man to the scene of the collapse. A mere glance was sufficient to show the shamefully overloaded condition, but in order to confirm his belief, he offered to take the load from the disabled car, and remove it to its destination. Several trips were made to deliver the cargo. En route, the representative had the cargo weighed. The total amount of material on the five-ton truck amounted to twice its capacity, being a total of ten tons. This had probably been going on for some time, with the result that finally the machine gave way under the strain.

The extent of the injuries was ascertained, and word was sent out to the owner that an over-load of five tons had destroyed the protection that went with the guarantee, and that the expense of rebuilding would have to be stood by the owner, the man responsible for the abuse of the machine. This was such a clear case of over-loading indicating that the owner either had not been thoroughly apprised of the loss which would soon follow the continuance of over-loading, or had not been sufficiently cautioned at the outset.

Overloading is one of the easiest things that can be done, but it is one of the most important items that should be avoided. Strong emphasis should be given by motor truck manufacturers and their salesmen interviewing a prospective purchaser of a motor truck, to the effect that the greatest abuse inflicted on the motor truck in this, its early period of practical use, is the abuse of overspeeding and overloading.



New White Sales and Service Station

The new Boston sales and service station of The White Company, now under construction on Commonwealth Avenue, is here shown. The area of the ground floor will be more than an acre and every department of the new building is being laid out on lines that tend toward the highest efficiency. The salesroom will have a floor space of 95 x 94 feet, exclusive of an annex, just off the main salesroom, for the display of exchanged and rebuilt cars only. In addition to the space for the display of vehicles, there will be desk room for twelve salesmen, along one of the broad aisles of the main showroom, and the general administration offices will also be located on the main floor, adjoining the showroom. The service station, stockrooms, accounting department and garage will be reached from the entrance in the rear.

# Trucks Assist in the Great Work of Road Building and Street Cleaning

## Contractors Displacing Horses by Commercial Cars—Results of Tests Using Trailers—Interesting Cost Figures

BY E. S. FOLJAMBE

 T has been said that the state of civilization of a country can be told by the condition of its roads. If this is true, parts at least of the United States are certainly in an uncivilized condition. However, widespread interest is now manifest in the Good Roads Movement, which has undoubtedly been brought about by the advent of the motor-driven vehicle. Everywhere efforts are being made to construct suitable roads and ones which will be permanent. In this work commercial cars are playing an important part as carriers of rock, crushed stone, gravel, asphalt, concrete, cement, oil, Tarvia, etc.

According to the Interstate Commerce Commission reports roads are in such bad condition in many sections, that it costs the farmer 23 cents to haul a ton a mile, while 6 to 7 cents should be ample. This excessive cost must of necessity be added to the market price of the product, and adds to the high cost of living. 300,000 tons of farm produce, according to William H. Davis, Jr., of the Locomobile Company, is the average yearly haul by the railroads, and that bad roads increase this cost \$250,000 annually due to delayed transportation. This does not include the properties which might be utilized if the roads were suitable for hauling. This enormous yearly waste would build 200,000 miles of modern macadam road a year, and in 10 years, figuring on a cost of from \$3000 to \$15,000 per mile, it would revolutionize many of our country districts. The details of modern road construction will not be entered into here, but a brief mention will be made of how modern motor-driven vehicles are assisting in the work.

### Saving Shown by Mack Trucks Used by Contractors of Baltimore

In Mount Washington, McMahon Brothers use a 5 and a 4-ton Mack fitted with automatic dumping bodies for hauling broken stone for road work. The Schwind Quarry Company, of Baltimore, also use these machines.

### A Test

In order to show what could be done, Messrs. Hook and Ford ran a week's test with a 5-ton Mack with the latest dumping body, in competition with a 4-mule team wagon. The test was hauling broken stone for road building from the quarry. Owing to an unsafe bridge, the truck had to go out of its way, making its round trip 10 miles as against 9 for the team. The route included one of 14 per cent. grade, which had to be negotiated with load. The conditions were as follows:

Round Trip, 10 miles.  
Average Gasoline Consumed, 21 gals. per trip.  
Average Oil Used, 2 gals. per trip.  
Working Hours per Day, 10.  
Average Time of Loading, 3 minutes.  
Average Time for Unloading, 10 minutes.  
Total Load Carried, 60,000 lbs.  
Number of Trips, 6.  
Total Mileage, 60.

The following figures give an accurate comparison of the work done, and the cost of same by the two methods.

### Four-Mule Team Hauling Four and a Half Tons Per Day, Twenty-seven Miles

#### First Cost

Four mules at \$325 each .....	\$1,300.00
Harness .....	75.00
Wagon .....	250.00
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\$1,625.00

#### Mules

Interest on one-half investment at 6 per cent...	\$48.75
Insurance on team .....	32.50
Depreciation 20 per cent. ....	325.00
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\$406.25

Fixed charges per year .....	1.85
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Costs Per Day, Assuming 225 Working Days Per Year	
Wages per day .....	\$1.84
Feeding at .60 per head .....	2.40
Stable man .....	.25
Doctor .....	.20
Shoeing .....	.30
Repairs .....	.20
140 days' feeding at 40 cents per head, \$224.00*	.99
<hr/>	
Total daily operating cost .....	\$6.18
Fixed charges per day .....	1.85
<hr/>	

\$8.03

### Five-Ton Dump Truck Hauling Five Tons Per Day, Sixty Miles

#### First Cost

Truck .....	\$5,300.00
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#### Truck

Interest on the investment at 6 per cent...	\$159.00
Insurance on truck, 2½ per cent. on 80 per cent. of one-half value .....	53.00
Depreciation on truck (not including tires) ....	480.00
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\$692.00

Fixed charges per year .....	3.07
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#### Assuming 225 Working Days Per Year

Wages per day .....	\$2.50
Maintenance, 4½ cents per mile .....	2.70
Tires, 6 cents per mile .....	3.60
Gasoline, 4 cents per mile .....	2.40
Oil .....	.60
<hr/>	
\$11.80	
3.07	
<hr/>	

\$14.87

These machines with dumping bodies also had a big advantage over horse trucks, owing to the fact that the stone could be spread by raising the body as the truck moved, requiring but 10 minutes to a load, and doing the work better than could be done by hand, to say nothing of the fact that this work would have required 2 men with shovels an hour. From these figures it will be seen that the 4-mule team did 57.37 ton miles per day at a cost of 13.9 cents per ton mile. The 5-ton truck, 150 ton miles per day, cost 9.9 cents per ton mile, or a saving of 4 cents per ton mile, or about \$6 per day saved.

\*Due to the mules not working, the quarry being shut down owing to cold weather.

### Use of Trailers With Results of Tests, Showing Low Costs As Compared With Horses

Contractors are beginning to use trailers where conditions make this possible. In the accompanying page illustration is shown a Knox 6-ton truck hauling two trailers of 3 yds. capacity each. Both the truck and trailers are fitted with special quick dumping bodies to facilitate delivery. Two such road trucks have been in active work in Sioux City, Ia., for the past year, in road building, and have delivered an average of  $44\frac{1}{2}$  yds. of material per day, a distance of  $3\frac{1}{2}$  miles. The contractors estimate that it would have required over 10 two-horse teams to do this amount of work, and that the cost by horses would have been at least double. Grades averaging from 3 to  $7\frac{1}{2}$  per cent were negotiated without difficulty.

The work which can be done by trailers under proper conditions is noteworthy. The actual costs, and the loads carried as shown by tests, will no doubt be interesting. Some tests of this kind were made at the request of the Troy Wagon Works Company, by Richard Turner Dana, M. Am. Soc. C. E., directing the Construction Service Company, of New York, and Morgan Cilley, Assoc. M. Am. Soc. C. E., Consulting Engineer of the Troy Wagon Works Company, Troy, Ohio. The dump wagons used were of Troy manufacture, 3 yds. capacity, and also  $1\frac{1}{2}$  yd. team dump wagons. Four different contracts were studied, and curves plotted showing the haulage costs per ton up to  $3\frac{1}{2}$  miles.

Studying these curves, Fig. 1, it will be noted that wide savings are effected by the train (indicated by the solid line) over the teams (indicated by the dotted line) in the longer hauls, as, for instance, assuming a haulage of crushed stone in a six-wagon train (or 40,000 lbs. per load), and in a two-horse bottom dump wagon train (or 4,000 lbs.) for two miles, indicate a cost of 20 cents per ton and  $46\frac{1}{2}$  cents per ton, respectively. But it will be seen that the curves cross at about 1500 feet, showing that the teams are cheaper than the train for short hauls.

The reason for the curves crossing lies in the proportion of lost time to the actual time of hauling. All measures of

efficiency are based on delivery, delivery being directly proportional to a combination of the average speed and capacity of the outfit, and the average speed depending upon the proportion of lost time to the actual time of hauling.

Exhaustive tests show that the poor showing on short hauls is not due to lack of economy in the operation of the

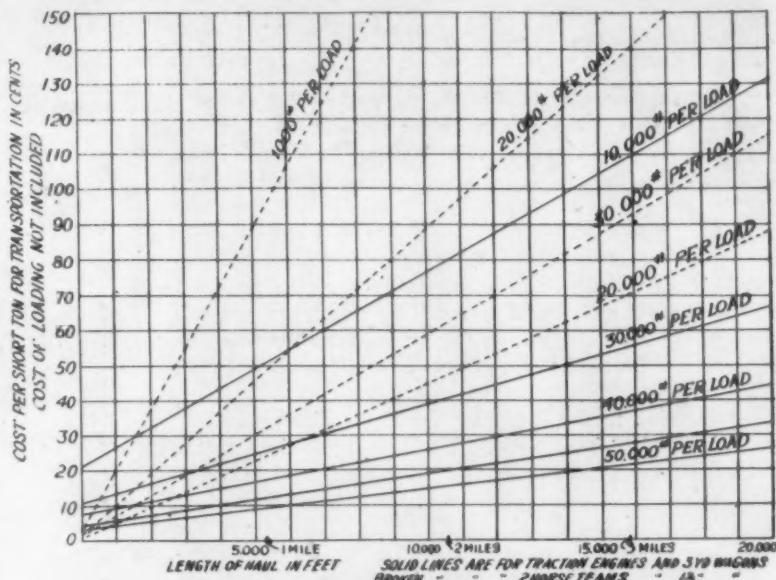


Fig. 1. Comparative Costs Per Ton Mile for Hauling by Two-Horse Teams and Traction-Engine Trains

truck. The lost time which affects the rate of delivery so largely must, therefore, be responsible.

Five conditions of hauling will be considered and will be grouped so as to compare two team outfits to a motor truck and a motor truck to two trailer plants in hauling bricks as based on recent observations made at Detroit and other points.

The following tables give the total expense per day in the classes of hauling under consideration. For the motor outfit, the cost per ton contains the fixed charges per day and the operative expense per mile of loaded haul.

Table One

First condition: One team hauling one slat wagon.

Depreciation on wagon .....	\$ 0.0500
Interest .....	0.0135
Horse hire, including driver .....	5.0000
Repairs .....	0.1500
Liability Insurance .....	0.3000
Harness Care .....	0.0720
Incidental, including superintendence .....	0.5000
 Total cost per day .....	\$ 5.8155

This and the following depend so largely on the prevailing price of teams that they will vary according to locality.

Table Two

Second condition: One team hauling two rear dump wagons, in which one is loading and one constantly in transit.

Depreciation on wagons .....	\$ 0.2917
Interest .....	0.0788
Horse hire, including drivers .....	5.0000
Repairs .....	0.1200
Liability Insurance .....	0.0400
Harness Care .....	0.0720
Incidental, including superintendence .....	0.5000
 Total cost per day .....	\$ 6.1025

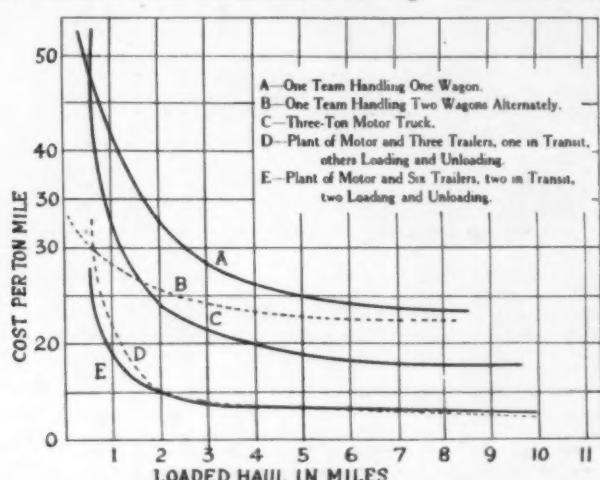


Fig. 2. Comparison of Costs of Hauling by Various Methods

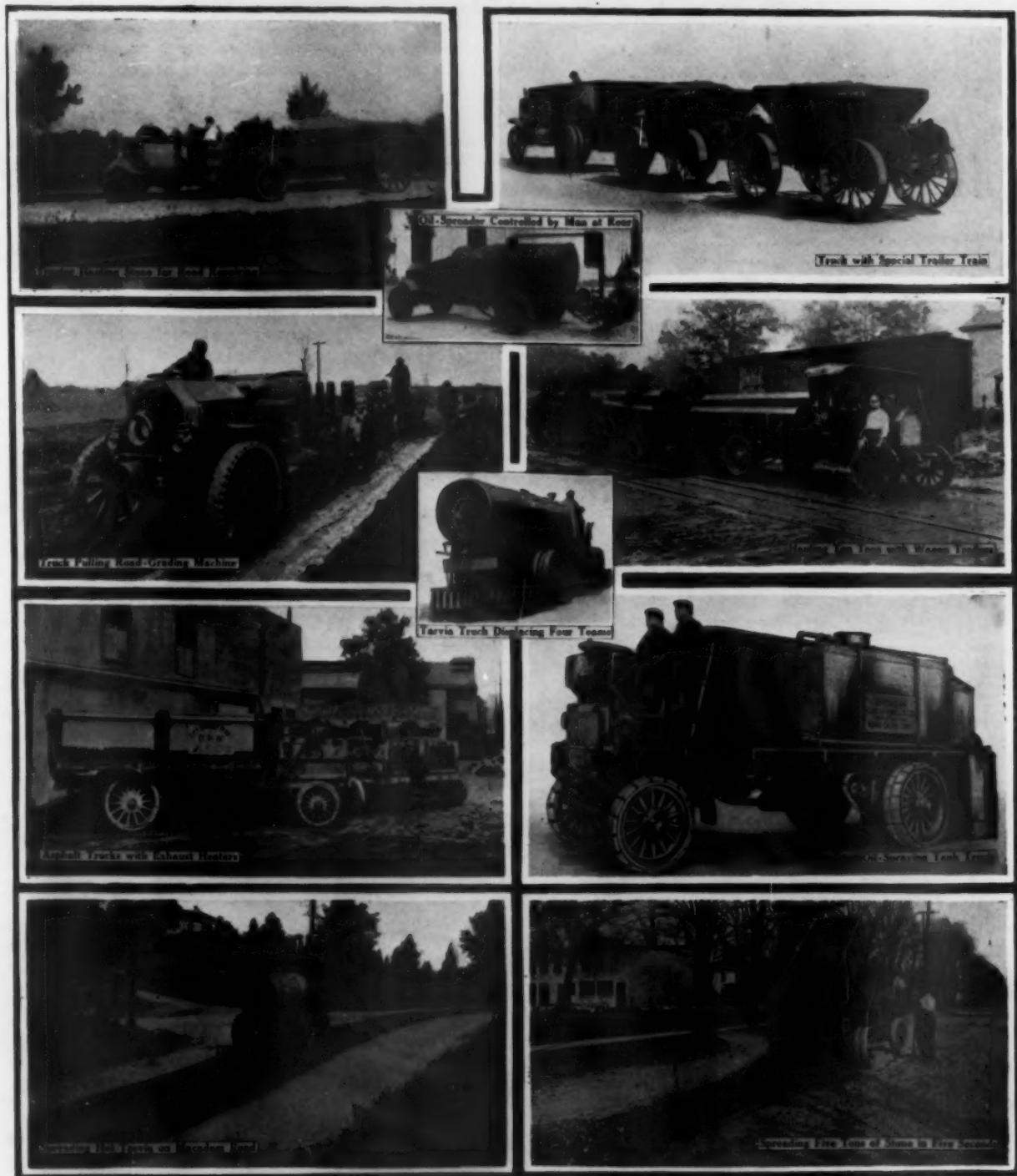


Fig. 3. Martin Tractor hauling broken stone for road repairs. The trailers, which are old horse-drawn wagons, can be easily attached or detached, so that they can be loaded or unloaded without detaining the motor.—Avery Truck in use by Lyon Company, Kansas City, showing the grading machine being hauled behind the truck. Note the special split rim, which is attached to the rear wheel of the truck when used in this kind of service.—Three Alco Six and a Half Ton Trucks operated by the city of Pittsburgh, hauling asphalt for street paving. These machines have heaters connected to the exhaust of the engine, which keep the asphalt at the proper temperature.—Six and a Half Ton Alco with one thousand gallon tank, in use by the Barrett Manufacturing Company, spreading Tarvia on a macadam road by means of a pump driven from the motor.—Knox Truck with special trailers, hauling crushed stone for road construction, at one-half the cost of doing the same work by horses.—Purcell Coal & Feed Company's truck at Cincinnati, Ohio, hauling ten tons of pipe, by means of ordinary wagons as trailers.—Knox Oil-Spraying Truck; constructed especially for road oiling.—GMC Automatic Dump Truck dumping and spreading five tons of broken rock in fifteen seconds. The body is power-operated through the transmission, by worm and worm wheel, controlled by hand lever at the driver's seat.—W. E. Witmore Road Improvement Company's Avery Truck, employed for spreading oil at Dayton, Ohio. Note the operator, who controls the flow from the seat at the rear.—Locomobile Truck used in spreading Tarvia. This truck displaced four teams and six men, at a less cost.

Table Three

Third condition: Three-ton motor truck delivering its rated capacity.	
Depreciation	2.3333
Interest	0.4200
Chauffeur	4.0000
Garage	0.8333
Insurance	0.5000
 Total fixed charge per day	 8.0866
Tires, 8000 miles	0.0438
Gasoline	0.0485
Lubricant	0.0050
Grease, etc.	0.0025
Incidental	0.0147
Repairs	0.0400
 Total charge per mile loaded	 0.1545

Owing to the extra wear on the tires, observed in the Troy tests in hauling the trailers, the mileage of the tires in the two following tables is reduced:

Table Four

Fourth condition: A motor truck acting solely as a tractor and a plant of three trailers in which one is loading and one unloading, and one constantly in transit:

Motor per day fixed costs, Table 3	\$ 8.0866
Depreciation on Trailers	1.2000
Interest	0.4500
Storage of Trailers	0.5000
Insurance	0.5000
 Total fixed cost per day	 \$ 10.7366
Tires, 5000 miles	\$ 0.0700
Gasoline	0.0485
Lubricant	0.0050
Grease and waste	0.0050
Repairs to motor	0.0500
Repairs to trailers	0.0300
Incidental (5 per cent.)	0.0104
 Total cost per mile loaded	 \$ 0.2189

Table Five

Fifth condition: A motor truck acting solely as a tractor and a plant of six trailers in which two are loading, two unloading, and two constantly in transit:

Motor per day, fixed costs, Table 3	\$ 8.0866
Depreciation on trailers	2.1000
Interest	0.9000
Helper	1.5000
Storage of trailers	0.5000
Insurance	1.0000
Superintendence	1.5000
Extra Labor loading and unloading	12.0000
 Total fixed cost per day	 \$ 27.8866
Tires, 4000 miles	\$ 0.0875
Gasoline	0.1215
Lubricant	0.0100
Grease and waste	0.0050
Repairs on motor	0.0600
Repairs on trailers	0.0600
Incidental	0.0162
 Total cost per mile loaded	 \$ 0.3602

This and the following depend so largely on the prevailing price of teams that they will vary according to locality.

Owing to the extra wear on the tires, observed in the Troy tests in hauling the trailers, the mileage of the tires in the two following tables is reduced.

A high combination of speed and capacity must compensate for the increased cost of the motor truck; therefore, increase of capacity without a corresponding decrease in speed, tend towards the solution of the problem.

In the majority of cases, bins or mechanical handling devices, especially in city railway yards, are impossible.

To solve the problem under these conditions, trailers have been tried.

### Specially Built Trailers Necessary

In the absence of especially designed trailers, makeshifts were employed, such as team wagons with stub tongues and the larger traction drawn wagons, but all were found to be impractical at the usual speed of the motor truck.

A trailer must be one that will stand up to the stress of higher speeds with plain, stout, well lubricated bearings, one that will track perfectly with the motor on curves, that is reversible, that may be pushed or drawn at will, and small enough to be easily used in trains, so that by its ease in handling, the lost time will be reduced to a minimum.

### Effect of Trailers on the Cost of Delivery

The time observed at Detroit in handling brick was from 15 to 20 minutes per thousand (5 tons) for loading and unloading, which seems to be about the time required for loading and unloading 5 tons regardless of the size of the brick.

Complicated problems of reversing, turning, backing of the trailers, together with the unusual wear they will sustain, make the designing of the trailer a difficult problem. But if springs, automatic steering devices, shock absorbers, etc., are incorporated, the economy that is shown will be effected. And by use of such trailers, designers of motors will find their problem greatly simplified, because a large percentage of the damage to the motor truck is due to the shock of the unloaded work—springs designed for heavy loads are so stiff that they make the truck practically springless when running light."

### Tests of Truck With Train of Trailers

To obtain data as to the ability of motor trucks to handle trailers, the Troy Wagon Works Company, of Troy, Ohio, in conjunction with the Kelly-Springfield Motor Truck Company, of Springfield, Ohio, conducted a series of sixteen experiments with a Kelly three-ton motor truck and Troy Trailers.



Fig. 4. Kelly Three-Ton Truck With Trailer Train on Test Run. Note Iron Block on Truck, For Traction

Ten tests were made in the city streets to determine the feasibility of making others on a more extensive scale. Only a short description and summary of these will be given.

"The Kelly truck was of three ton capacity and rated at 35 h. p., geared with four speeds, 12 miles being the highest. It carried a load during the entire test of two blocks of iron, each weighing 2200 lbs. The truck weighed 5200 lbs. One, two and three trailers were used (see Fig. 4), each weighing approximately 4000 lbs., and having a carrying capacity of five tons.

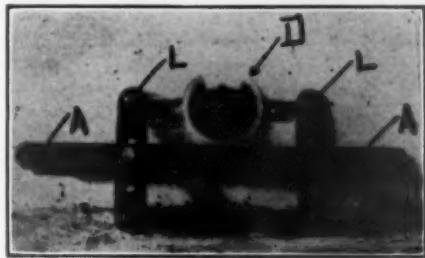


Fig. 5. Kohlbusch Dynamometer

During most of the test, the trailers carried four tons each, but in the latter part were fully loaded to five tons.

Draw bar drafts were recorded at every tenth revolution of the trailer wheels (about every 100 ft., the wheels being approximately 10 ft. in circumference). The drafts were read from a Kohlbusch dynamometer, D, see Fig. 5, which was mounted in a frame, consisting of a draw bar, A, working between the centers of the two leaves, LL. One end of the levers was fastened and one end attached to the dynamometer. Fig. 6 shows the method of coupling the dynamometer between the motor truck and the trailer, the dynamometer, therefore, recording one-half the actual pull. Time was kept by a stop watch and was recorded at every station from which the velocity was determined. Grades of the route were obtained from the city engineer's office.

#### Backing Tests

During the test, while on the brick pavement, a demonstration of rigidity of the trailer for backing and its flexibility in making curves and turns were made. The three trailers were loaded with four tons and with the forward draw bars



Fig. 6. Method of Attaching Dynamometer Between Truck and Trailer

locked, the rear draw bars free and one man steering the trailer, the train was backed 400 ft. and around a 90 degree corner and could have been backed into any desired position, showing that while rigid enough to prevent buckling, the train was flexible enough to be steered around curves and turns. This same test was successfully made on macadam streets with the trailers loaded with five tons each.

In the final experiments, over a seven-mile surveyed route, a Kelly three-ton 40 h. p. truck of latest design was used, having three speeds, the highest 12 m. p. h. The same dynamometer and frame of the preceding experiments were used.

Printed record sheets were used and six runs made. Observers recorded, time of day, gasoline, dynamometer, time of passing posts on surveyed route, revolutions of trailer wheels, etc.

After all the reductions were made, the profile of the course noting the various pavements encountered, the actual draw bar drafts, the speed gears used and the various velocities were plotted for the entire route. These are shown in Fig. 7, the draft, speed clutch and actual velocity curves being

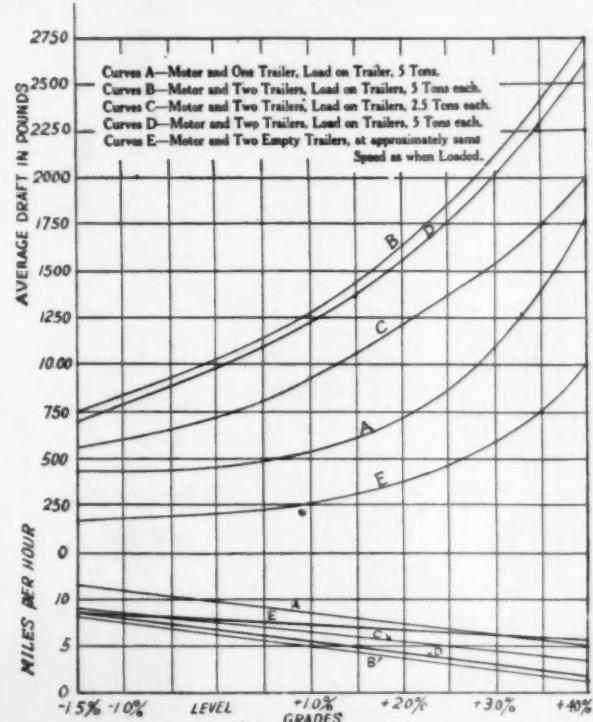


Fig. 7. Draft, Speed Clutch and Velocity Curves

grouped together and marked A, B and C, respectively, for the various tests.

The stations of the route or distance between readings and landmarks are indicated by the vertical lines, the interval being 1000 ft.

Note the similarity between the various draft curves and relations between draft curves and corresponding velocity curves.

In fact, so consistent are the curves in each test that by means of them, an error of 10 ft. in the reduction of the level notes was found.

The loads used on the motor truck were 2250 lb. cast iron blocks and on the trailers steel axles, 122 lbs. each. The live loads include these blocks, the axles and the men riding,

except that the chauffeur, was considered part of the weight of the truck. The truck dead load was 7980 lbs., the trailer trucks 4080 lbs. each.

### Live Load Reduced, Still Obtained Traction

Tests of the maximum draft and tractive ability of the motor truck were made. In the 13th test the motor was stalled in four places. In the 15th test the live load on the truck was reduced from 2.6 to 1.4 tons, to observe to what extent the live load of the previous run was responsible for the stalling and the effect of the reduction of the load on the tractive ability of the motor.

There was no loss of traction due to the reduced load and one of the hills on which it stalled on the 13th test was successfully negotiated. The other hills on which the motor stalled in the 13th test were found to be prohibitive in the 15th and the weight of the motor might have been still further reduced. In other words, the 15th test was made to learn to what extent the stalling was due to the load carried by the truck and if the reduction would cause loss of traction, the result showing that the truck could be materially lightened and that the ability of the motor was sufficient to maintain a sustained pull of more than 3000 lbs., and to handle a dead and live trailer load of fourteen tons on good roads and grades up to 3 per cent.

The 13th and 15th tests also demonstrated the advisability of smaller units in trailer trains.

### Conclusions From Tests

On ordinary pavements, at average speeds and usual grades the draft required by one trailer with a five-ton load ranges from 400 to 2000 lbs. and from 750 to 3000 lbs. for two trailers loaded with five tons each, averaging from 50 to 200 lbs. per ton. This, together with the increased delivery and the remarkable economy, prove that the trailers more nearly solve the problem of street and highway transportation than anything heretofore."

### Motor Truck Draws Grading Machine, Saving Fifty Per Cent Over Horses

An Avery truck is used in Lyon County, Kansas, using a grading machine as a trailer, as shown in an accompanying illustration. Reports of a test showed a saving of \$11.46 per day, the truck doing more work than was formerly accomplished with four teams. The figures are as follows:

#### Cost With Teams

4 Teams and drivers .....	\$16.00
Man on grader .....	2.50
Total per day .....	\$18.50

#### Cost With Trucks

Man on Truck .....	\$2.50
Man on grader .....	2.50
12 gals. of gasoline .....	1.44
1 gal. oil .....	.60
Total .....	\$7.04

These figures must be taken, however, with the understanding that no depreciation is figured in, nor is the interest on the investment considered, but as the engineer in charge reported that he could do half again as much work with the truck in the same length of time as with four teams on the grading machine, it is safe to say that there is considerable saving by using the truck.

### Trucks Make Possible Distant Road Construction, and Repairs With Hot Tarvia

In a recent conversation with P. P. Sharples, who is in charge of the commercial cars used by the Barrett Manufacturing Company, the point was brought out that the Barrett Manufacturing Company put on trucks not so much with an idea of economy as with the object of increasing the range of delivery of the hot Tarvia ready to put on the road. With horses, 15 to 20 miles from the loading tanks was the limit, and calls were repeatedly coming in from points 25 to 30 miles away, and even further, to have their roads Tarviated.

As early as 1909 the Barrett Manufacturing Company sent a representative to Europe, and imported a Mann steam truck, fitted with a tank, with steam heating coils and spreading apparatus. This was a heavy, cumbersome affair,— and although it had a record of standing up fairly well on English roads, was junk at the end of one year over American roads. During the following year, 1910, no trucks were used. In the Spring of 1911, however, they bought a three and a five-ton Alco, the larger one having a tank fitted with steam heating coils, so that it could be connected to a steam roller, and its contents heated and forced out by steam pressure. The use of this truck immediately extended the radius to 40 miles, and it delivered in the neighborhood of 200,000 gallons of material the first year.

### Over Ten Miles, Trucks Show Saving

In regard to the cost of operation, Mr. Sharples stated as follows: "For distances of less than 10 miles, horses are cheaper than the truck, as short haul economy is entirely dependent upon the quickness of loading and unloading, and as this time is a large per cent. of the time on short hauls, very little can be saved by using trucks on these short hauls." About three quarters of an hour is required for loading and about an hour for unloading. Unloading, of course, is done directly upon the road, spreading the Tarvia where desired.

(Continued on page 49)



Fig. 8. Detail View of Rear of Six-Ton Tarvia Truck, Showing Spreaders

# At the Boston Truck Show

**T**HE enormous Mechanics' Building, on Huntington avenue, was the scene of much activity immediately following the Pleasure Car Show, the building being cleaned and prepared for the Truck Show.

The same decorations that graced the Pleasure Car Show were of course employed, the scheme of decoration in the Grand Hall being taken from the famous Hanging Gardens of Babylon. Some very large and well executed mural paintings, together with palm trees, gave

to fewer accessory exhibitors, the large concerns were enabled to get sufficient space to show their machines to advantage, and many interesting vehicles which could not be exhibited at New York or Chicago were on view.

Following our usual custom we are not going into the details of the exhibitors whose products were shown at the previous shows. There were only two new commercial cars, namely, the Sowers gasoline truck, and the Edison electric truck, both products of Boston and vicinity.



a realistic effect. Other parts of the building represented a New England garden scene.

The trucks were brought into the building from the rear up a temporary runway by power. This was supplied by a small steam winch and cable. In an accompanying illustration is shown a truck ready to be drawn up the incline. By this means the cars were quickly and easily handled, although not under their own power.

This show was the best that has yet been held in Boston, more trucks being exhibited than at any previous time. Owing

## THE SOWER ONE AND A HALF TON MODEL

This truck, which is the product of the Sowers Motor Truck Company, of Boston, embodies no new or radical features. The makers are putting it on the market as a standard machine, made from the best standard parts of the well-known makers. It is assembled, but assembled in the right way, that is, it was designed by a competent engineer and the parts worked into the design, the makers believing that this gives a better truck than it is possible for any company to make that tries to manufacture

each and every part of the construction. A large factor of safety for overload has been provided, and this combined with the quality of materials used, should give a very satisfactory machine.

Two types are to be marketed, one with the engine under the hood and the other with the engine under the seat. The one shown had the latter arrangement. All energies are devoted to this one model of 3000 lbs. capacity, the chassis selling for \$1900, bodies optional and to order.

The general construction is: Four-cylinder Wisconsin motor under the seat or under the hood; Brown-Lipe three-speed transmission jack shaft; drive to the rear wheels with side chains.

### The Motor

The motor has a bore of  $3\frac{3}{4}$  in., and a stroke of 5 in., cylinders cast en bloc, all valves enclosed. This engine is designed especially for truck work; bearings are large throughout; it is mounted on a sub-frame of pressed channel section steel, at 4 points, by integral crank case arms. The lubrication is by gear pump driven from the cam shaft by bevel gears inside of the case. This forces oil to all of the bearings under pressure, the overflow passing through a strainer into the crank case sump, from which it is drawn again for the various bearings. Ignition is high tension, using Bosch magneto, and carburetion by a Schebler carburetor. The thermo-syphon system of cooling is employed, with an improved type square tube radiator, which is suspended on springs and assisted by a large fan.

Clutch is of cone type, leather faced, with auxiliary springs for easy engagement. It is 14 in. in diameter by  $2\frac{1}{2}$  in. face. The change speed gear, as mentioned, is of Brown-Lipe manufacture, giving three speeds forward and one reverse, direct on third. The gears are all nickel steel with 1 in. width of face. The transmission is bolted directly to the crank shaft housing, forming a unit assembly, carried in cast steel hangers from the under side of the frame. Heavy roller chains drive to the rear wheel sprockets. Between the motor and the transmission are two Hartford universal joints.

The frame is of channel section pressed steel  $4\frac{1}{2}$  by 4 in., these wide top and bottom flanges forming a reinforcement. It is narrow at the front and has four cross-frame members.

### Springs

The car exhibited had a platform spring at the rear, but semi-elliptic springs are to be used both front and rear, the rear being  $48 \times 2\frac{1}{2}$  in., banded and shackled at both ends, while the front springs are  $41 \times 2\frac{1}{2}$  in. wide, shackled at the rear ends, and attached in the usual manner to a spring horn at the front.

The rear axle is of solid nickel steel, rectangular section  $3 \times 2$  in. Adjustable radius rods, provided with a universal motion, eliminate all stresses from the frame, and maintain the chain distance. The rear wheels are mounted on New Departure double row ball bearings.

### Brakes

There are two sets of double acting fabric faced brakes on the rear wheels, the service brake being internal expanding, and the emergency, external contracting. Drums are 14 in. in diameter by  $2\frac{1}{2}$  in. face, and are bolted through the wheel hub plates. They are operated through eveners.

Steering is by the latest Ross worm and nut type, with large bearings for heavy service, and provided with easy adjustments. The steering gear housing is mounted on the main frame.

The steering wheel is on the right side, with the change gear lever and emergency brake lever at the right of the driver. Both brakes are controlled by pedals. The throttle and spark levers are on the steering column, just below the wheel.

U. S. tires are standard equipment,  $36 \times 3\frac{1}{2}$  in. on the front and  $40 \times 4$  in. on the rear. The wheelbase with the engine under the seat is short for the loading platform, which is provided, being only 120 in.

With the motor under the hood, the wheel base of necessity is longer, being 140 in., tread 56 in. in both cases.

The loading space is  $10\frac{1}{2} \times 5$  ft. wide in the stake body type. An 18 gal. gasoline tank is located under the seat. The truck has a speed of 16 m.p.h. As before mentioned, the price is on the chassis only, being \$1900.

A feature of the truck is the use of metal wherever possible, the dash being cast aluminum; floor boards are cast iron, and in succeeding models the side plates and sides of the lower portion of the seat will be of metal.

### EDISON ELECTRIC TRUCK

A new electric truck, known as the Edison electric, was shown for the first time at Boston by the Edison Electric Vehicle Company of America, Lawrence, Mass. This company is not only manufacturing electric trucks, but also pleasure cars.

### One Thousand Pound Electric Truck

At the show were exhibited a 1000-lb. wagon with express body and top with side curtains, and also a  $1\frac{1}{2}$  ton model. On the street two one-ton trucks were used in demonstrating, one fitted with a bakery wagon body and the other an open express body.

### Worm Drive

One of the chief features of this new truck is the use of the worm drive. A single motor of Westinghouse manufacture is mounted at the center of the frame just forward of the rear axle, and drive is by enclosed shaft to the worm. Two Spicer universal joints are employed in this driving shaft, carrying for all relative movements between the rear axle and the motor. A battery of 60 A-4 Edison cells is underslung in a wooden battery box at the center of the chassis on the 1000 lb. car. On the  $1\frac{1}{2}$ -ton car the arrangement is the same, but 60 A-8 cells are employed. The steering wheel is at the left with



The Sowers One and a Half Ton Truck With Stake Body

two brake pedals at the right of the column, the pull rods connecting the brakes being parallel to and outside of the frame. These brakes are of the usual expanding and contracting type on rear wheel drums. The frame is of channel section structural steel but is not heavy or cumbersome. The whole car gives the impression of lightness. The battery box is not deep and therefore helps in this respect.

#### Springs

Another unusual feature is the use of platform springs front and rear. These springs have an unusually large amount of camber. The use of grease cups on all the spring bolts and similar locations is noticeable.

The controller is of continuous torque type, located directly under the cushions in a compartment under the seat. The control lever is at the left of the seat.

The wheelbase of the 1000 lb. car is 102 in. Prices on application.



The Edison One Thousand Pound Electric

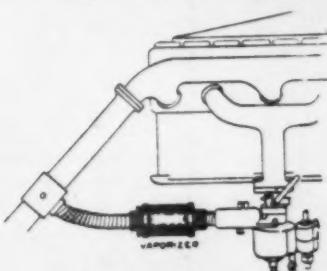
## New Accessories Exhibited at Boston

### ARNOLD ELECTRIC VAPORIZERS

Numerous devices are making their appearance for assisting and starting engines when cold and on account of low grade fuels. The latest made its appearance at the Boston Show and is known as the Arnold Electric Vaporizer, manufactured by the Arnold Electric Company, 93 Massachusetts Avenue, Boston, Mass. This is a device which, as implied by the name, warms the incoming air by means of passing it through electrically heated coils. The device is about 3 x 6 in. and clamps to any carburetor and the permanent air intake pipe. After being turned on it heats up in about a minute and it is claimed will greatly assist self-starters, prolonging the life of the batteries of the electric starters, saving air on the compressed air types and preventing the springs of spring starters from being entirely unwound. With ordinary ignition it

is said to economize gas and make it possible to start the engine without difficulty after standing and no matter how cold it

rosin enters into the composition. The prices compare favorably with ordinary paints, ranging for the varnishes from \$3.50 up to \$7 per gal. for the highest grade automobile body varnish.



The Vaporizer Attached

may be. The quality of gasoline does not matter as the heat is sufficient to vaporize the gasoline thoroughly. The price complete with switch, wire, couplings and directions to attach is \$12.50.

### RICKER-BENNETT VARNISHES AND STAINS

The Ricker-Bennett Company, 37 Harris Street, No. Cambridge, Mass., showed at the Boston Show for the first time their new stains, paints, varnishes, enamels, etc. These products are the result of seven years of tests. They are peculiar in that no oil is used and it is impossible to scratch the varnished surface, so that it will show a white streak. These varnishes are waterproof, do not require so many coats, dry quickly and are flexible when dry. A thin piece of metal which had been finished with this paint and varnish was bent back and forth repeatedly, even on a radius as small as 1-16 of an in. without the paint showing any signs of cracking or chipping. No



The Arnold Electric Vaporizer



Section of Expansion Tire  
Showing the core in black at the center, and the retaining metal rim, with an air space and the outer tire.



Action of the core of the expansion tire under jolts, showing how shocks are transmitted through the core to the upper part of the wheel before lifting the hub.

to be placed upon it. It is free to slip up and down between the holding lips of the retainer, but as soon as depressed into its retainer at any one point by contact with car tracks, stones, etc., it immediately springs outward again when the load is relieved, due to the fact that it is compressed.

In the ordinary wheel, road shocks are transmitted directly from the rim to the hub, while with this it is claimed that the compressed core is forced upward, and the shock transmitted circumferentially through the core and thence to the hub from a point at the top of the wheel. It is claimed that in effect it is a suspension device, giving pleasing resiliency.

It is especially designed for use on light commercial cars and on pleasure automobiles.

### ELLIOTT FLEXIBLE ROTARY VALVE ENGINE

Another rotary valve engine made itself known for the first time at the Boston Show. This is the product of the Elliott Motor Engine Company, Waltham, Mass.



Elliott Flexible Rotary Valve Engine; showing housing of all movable parts

It is the work of Gilbert R. Elliott, president of the company, former master mechanic of the Canadian Pacific R. R. The motor shown was built on a Wisconsin motor crank case, the lower portion of the engine being standard in every respect. The upper construction, however, is entirely new and novel. The rotary valves are in the form of a slightly tubular shaped piece of cast iron, one at each side near the top of the cylinders, running parallel to the crank shaft. These rotary valves, however, are made in sections as shown in the accompanying illustration. The ends are notched very similar to a lug clutch so that when

these ends engage, the entire set of valves rotate as one solid piece. It will be noticed that there is a slot in the side, the cast iron valve being turned .008 oversize and sprung into the hole in the en bloc cylinder casting. Thus it exerts an outward pressure similar to a piston ring, keeping it tight.

The oiling is by centrifugal pump on the magneto shaft which pumps from a well at the lower part of the crank case and a small vertical tank, about 2 x 6 in., where it overflows, passing through cored passages from the front to the rear end. This oil passes out through an overflow arrangement at the rear, the height of which overflow is



Chain Drive of the Two Rotary Valves

adjustable, thus determining the quantity of oil delivered to the valve. Other feeds lead to the hollow crank case, the oil being distributed by centrifugal force to the crank pins and supplying a spray caring for the crank case.

This type of valve gives the same opening at all speeds. As the port in the cylinder is considerably smaller than the opening in the valve the entire width of the cylinder port is open for a considerable period



One of the Slotted Rotary Valves

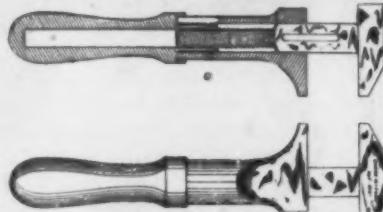
of time, allowing very full charges and free exhaust.

Fuel economy and cheapness of construction are also features claimed. The engine has a bore of 4 in. and a stroke of 5 in., and, it is claimed, has developed 41 h. p., which is about 9 h. p. more than the S. A. E. rating would give it.

### THE GLOBE WRENCH

The Globe Wrench Company, of Ipswich, Mass., exhibited for the first time at the Boston Show a new monkey wrench. This wrench, as will be seen from the accompanying illustration, is perfectly smooth on the outside; there are no exposed screw threads, all parts being enclosed. Adjustment is had by turning the entire outside of the handle. It is a one-hand wrench and has the desirable feature of not working

loose on the nut; in other words, the jaws cannot work apart increasing the space between them. This is brought about by the



Two Views of the New Globe Monkey Wrench

use of a hardened pin spring pressed into slight depressions in a circular collar at the forward end of the handle. For this reason nuts are not rounded off at the corners and mutilated when using the wrench. The jaws are of best open hearth steel drop forged. The pressure on the jaws is not taken by the screw thread as usual, but is received by a solid collar. The wrench will be made in all sizes, the 8-in. size being the one now placed upon the market.

The strength of this wrench is really phenomenal. Tests were made upon it in the laboratories of the Massachusetts Institute of Technology, Boston, in which a pressure of 1126 lbs. was required at a distance of 6 in. from the jaws in order to break it. The movable jaw and its shank were not even bent, the break occurring in the main jaw.

The adjustment worked perfectly after the test. The price of this wrench is \$1.50.

### THE BENTON CASE-HARDENED PLUG

A new ignition plug was shown for the first time at the Boston Show by L. F. Benton Company, of Vergennes, Vt.

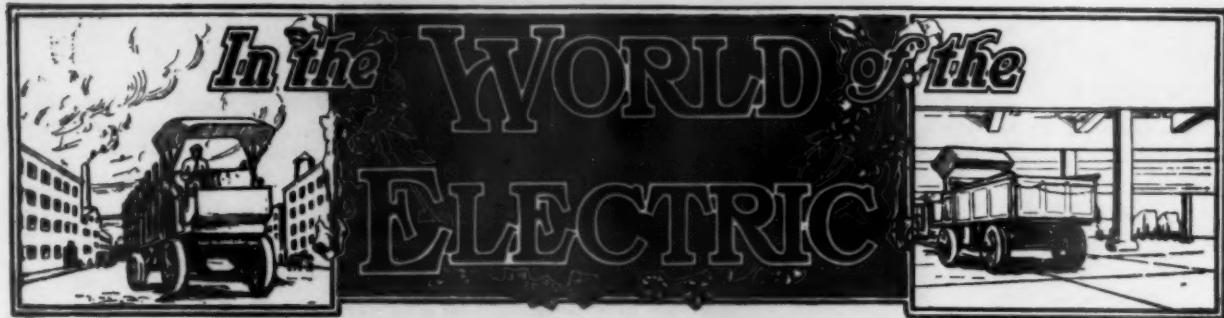
The feature of this plug is the arrangement of the insulating material. The insulation is composed of sheet mica which is spirally wound, being given a lap wind by a special process and forced with great pressure into a tapered hole into the case-hardened steel bushing. This construction insures a perfectly gas tight joint in the plug, but at the same time provides an insulation which it is claimed will neither crack nor disintegrate under heat nor absorb oil.



Showing Interior of Benton Plug

The electrodes are of extra heavy wire drawn from a special alloy of platinum and nickel which will neither fuse nor corrode.

These plugs are made in all sizes and types and are fully guaranteed and sell for \$1 in all standard sizes.



## MEETING OF THE ELECTRIC VEHICLE ASSOCIATION OF AMERICA

The March meeting of Electric Vehicle Association of America, held in the Engineering Societies Building, New York City, March 25, at 8 P. M., was called to order by the President, Arthur Williams. He announced that Louis J. Gerson, manager of the Automobile Department of the John Wanamaker Store was present, and as he had a scheme which was of interest to everyone in the Association, requested him to outline it.

John Wanamaker has become the Metropolitan Distributor of the Buffalo Electric Car, and has proposed an unusual campaign for the sale of these cars. Mr. Gerson stated that it was the intention of the Company to provide garage service and maintenance with each car for one year. This means that the purchaser of the car will not be bothered in any way with the maintenance of his car. The car will be sent by the Wanamaker Organization to its garage representative nearest the residence of the purchaser awaiting the daily usage of its owner. Certain garages will be appointed in this territory to act in this capacity. This is of great interest to all garage owners as well as Central Stations, and it is hoped that all will co-operate in this excellent plan to sell electric cars.

The speaker of the evening, Professor H. F. Thomson, was then introduced, and presented the paper entitled "Observations on Horse and Motor Trucking." This paper was illustrated by a few stereopticon slides. Extracts from this paper are published elsewhere in this issue.

Mr. Williams commented upon the excellent way in which the paper had been presented and the very useful information it contained. He said it has suggested to him that a Chair should be established in the Technical Institute for Transportation Engineering. He also brought out the point of increased efficiency which could be obtained by a 24-hour use of the street for delivery systems instead of the 12-hour day, as so much time is wasted at loading and unloading terminals.

It was also impressed upon the Association that they must realize their duty in protecting the public from over speeding.

excessively shrill whistles, etc. Also the condition of roads should be considered for pleasure cars as well as commercial. A license should not be paid and a privilege given to tear up the roads, but the roads should be protected from the speeding which is conceded to cut the roads more than heavy loads.

Mr. Curtis, who had attended the meeting of the Merchants' Association, said everything was being done to attract the use of the electric vehicle. It is understood that several department stores are co-operating in parcel delivery to save the great waste of many calls in the same neighborhood. One case was cited where 18 different delivery wagons called at the same apartment house in one morning.

In discussing the question of adequate loading and unloading facilities it was pointed out that in many of the old buildings no loading platforms were provided, and a single elevator was required to perform the work for all the tenants. Co-operation with architects to see that new buildings contained all the required devices for the constantly increasing number of vehicles, was suggested.

## DETROIT ELECTRIC INSTALLATION FOR HOUSTON, TEXAS

The first important electric commercial car equipment for Houston, Texas, was lately shipped by the Anderson Electric Car Company, manufacturers of the Detroit Electric. This fleet was purchased by the Houston Electric Light & Power Company, 1905. The number 1905 is a portion of the title of this concern, being part of the incorporated name.

The shipment consisted of four cars, three 1000 lb. trucks and one Gentleman's Roadster. Two trucks were equipped with express bodies and driver's tops, and were especially designed for inspection and construction service. The third truck was equipped with panel body and will be used for the installation of meters.

The Gentleman's Roadster is for the personal use of the general manager. This car will be employed in general inspection of the Houston Electric Light & Power Company's service throughout the city and suburbs.



The Four Detroit Electrics Lately Acquired by the Light and Power Company, 1905, of Houston, Texas

## Buffalo Electric Commercial Cars

The Buffalo Electric Vehicle Company, of Buffalo, N. Y., has added to its pleasure car business a line of commercial trucks, 1500 to 2000 lbs. and 3500 to 4000 lbs. The 1500 to 2000-lb. chassis are shaft driven.

### Motor, Brakes and Axles

The most important features of the one-ton chassis are the transmission and drive mechanism. The motor, of standard General Electric make, is suspended universally from a cross frame support tube by two arms, one on each side of the motor, the lower ends of which are equipped with trunnion attachment to a phosphor bronze band on the motor housing, allowing a universal action of the motor to suit the inequalities of the road.

Both motor and rear axle housing are rigidly coupled up by a connector tube of large diameter with wide flanges, forming a rigid unit which makes disalignment almost impossible.

The drive is accomplished by means of the internal and external gear coupling, the external gear being the driver on the armature shaft, and the internal gear being the driven member on the drive shaft. This joint takes care of inaccuracy of alignment and permits transmission of the full motor

efficiency to the rear axle, as well also eliminating thrust from the armature bearings or the armature itself. The drive shaft engages a set of double reduction gears in the axle, and the entire drive mechanism is carried in a dust-proof housing. The straight line drive obviates the necessity of universal joints.

Two sets of brakes are employed. The service brakes are internal expanding on each rear wheel, and the emergency brakes are external contracting on each rear wheel. Each has a braking surface of 125 sq. in., giving a total braking surface of 500 sq. in. Both sets are controlled by foot levers, and are adjusted by wing nuts, easily accessible under the front floor boards. Each radius rod is equipped with swivel joint on the rear end to compensate for road inequalities.

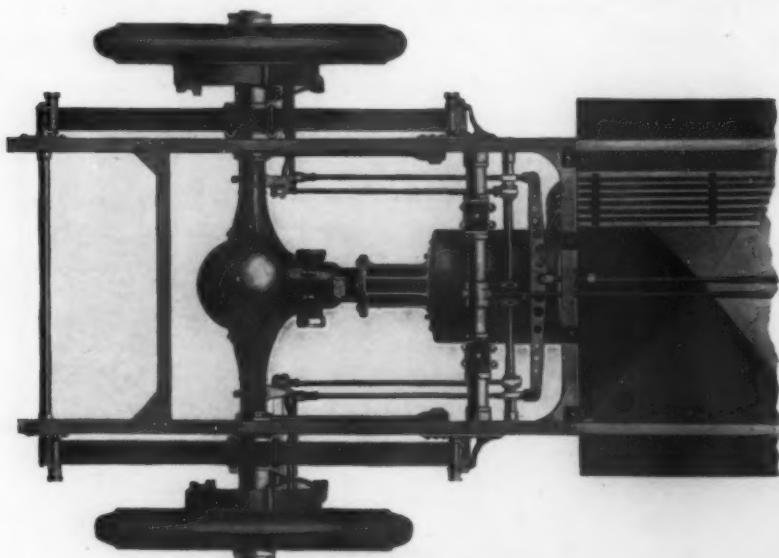
The rear axle is of the double reduction full-floating type, equipped with Timken tapered roller bearing. Timken front axles are used.

The worm and sector head type steering gear is employed, and is equipped with an 18 in. hand wheel. Timken bearings are used in the steering knuckles, and the steering post is braced from the dash.

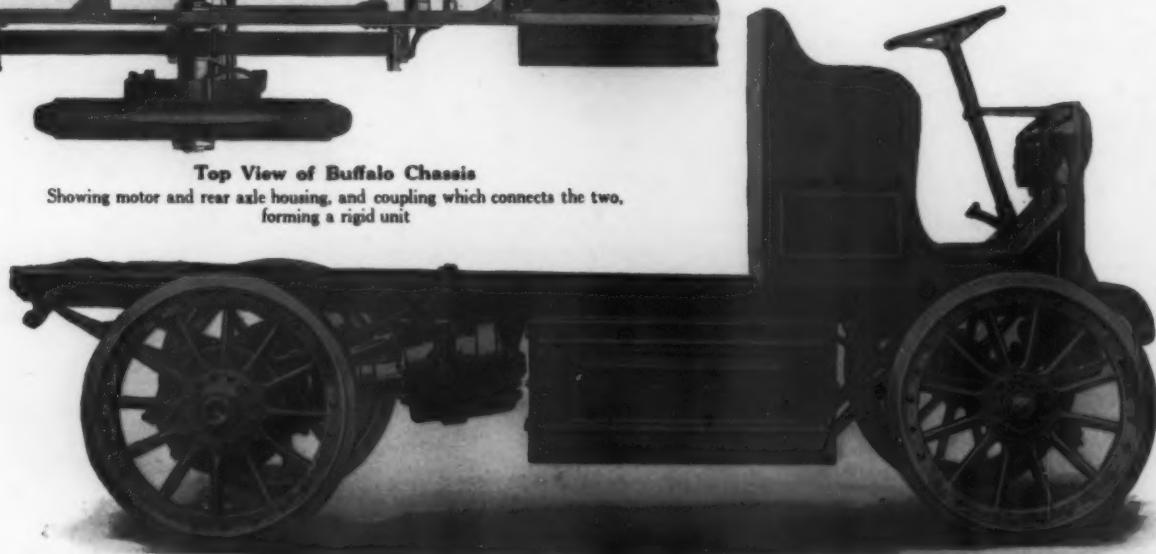
### Controller and Battery

The controller is of the continuous torque type, and is bolted to the frame cross members on the left side, underneath the driver's seat, and has no working parts exposed to dust and dirt. A door in the side of the driver's seat makes the controller easily accessible.

The battery equipment of the Buffalo electric light duty truck is 44-cell, 13-plate standard W. T. X. Philadelphia Lead Battery, and is carried in the battery box slung underneath the frame, rigidly braced to the frame in front. The cells are ar-



**Top View of Buffalo Chassis**  
Showing motor and rear axle housing, and coupling which connects the two, forming a rigid unit



**The Buffalo Electric Chassis—Shaft Drive**

ranged in crates, which are carried on channel tracks. The battery box doors, one on each side, open down to the position at right angles with their former closed position, and equipped with channel tracks which coincide with the channel tracks on the floor of the battery box, so that the crates are easily pulled out to the shelf formed by the battery box door, by its lowered position, and are easily accessible. The top of the battery box is protected by metal, which is pitched so as to run off any water or other elements which may go through the floor on it. The battery crates are held in position by a rod running along the base, and when it is desired to remove them, all that is necessary is to loosen a few bolts on the brace unit, which locks them in place. The wiring is properly insulated and carried from the batteries back to the motor or runway, and are held in place by spreaders.

### Frames, Springs, Etc.

The frame is pressed steel, channel section,  $4\frac{1}{2}$  in. x 3-16 in., with six cross members properly braced. The length of the frame is 149 in., width 40 in. The truck has a wheelbase of 102 in., tread 58 in., and the weight of the chassis, complete with batteries and temporary seat, 3700 lbs. Under ordinary conditions the truck develops a maximum speed of 12 miles an hour.

The load suspension is accomplished by semi-elliptic springs, both front and rear. The forward springs are carried under the frame, while the rear springs are side slung and shackled at both ends.

Standard tire equipment calls for S. A. E. fast electric standard solid tires  $36 \times 3\frac{1}{2}$  in., both front and rear.

In general, all bearings are provided with grease cups, and all wiring is thoroughly insulated and protected.

## Observations on Horse and Motor Trucking

BY HAROLD PENDER and H. F. THOMSON

EXTRACT of a paper read before the Electric Vehicle Association of America, at its monthly meeting, New York, March 25, 1913, on results of the investigation of trucking conditions by the Electrical Engineering Department of the Massachusetts Institute of Technology, Boston, Mass.

The work, up to the present, has been directed along two lines: first, the collection of operating costs from a number of users of commercial cars in the eastern part of the country; and, second, the study of the performance of horse wagons and motor cars in typical services around Boston. The purpose of this paper is to set forth an outline of the methods pursued in conducting these lines of work and to indicate the character of information which is being collected.

### Reports of Progress

The data collected up to March 1, 1912, were summarized and published in a bulletin entitled "The Economical Transportation of Merchandise in Metropolitan Districts."

All of the cost data upon motor trucks as collected prior to October 1st were summarized in a paper entitled "Notes on the Cost of Motor Trucking."

A copy of each of our bulletins will be sent gratis, upon request, to anyone interested in trucking and delivery work.

### Importance of Standing Time

The amount of work which any truck can do in a working day depends, first, upon the number of miles it is driven in a day, and, second, upon the standing time or time taken in loading and unloading. The first item depends primarily upon the speed of the truck, although in congested districts the speed may be largely determined by the average speed of all the traffic using the street. But the second item, which is equally important, depends primarily upon the loading and unloading conditions.

### Short Hauls

As an illustration, consider a horse-drawn wagon which travels 15 miles per day but which is actually moving only 3 out of 9 working hours; the average speed of the wagon therefore being 5 m. p. h. If this wagon is replaced by an electric truck of the same carrying capacity, whose average speed under the same traffic conditions would be 10 m. p. h., then the motor truck could cover this same distance of 15 miles in 15-10 or 1.5 hours; but if the loading and unloading conditions remain the same, the time required to perform the same service would be 6 plus 1.5, or 7.5 hours. That is, in 9 hours the motor truck could do only 9-7.5 or 1.25, or 20 per cent. more work, although its speed is twice that of the horse wagon.

However, in many short haul services the superior ability of the motor truck is frequently noticed in work about mill yards, where facility in reaching inconveniently situated platforms may be exceedingly important.

### Long Hauls

On the other hand, the long haul character of work offers to the motor an opportunity to utilize its superiority over horses with regard to greater speed and mileage capacity. Here the motor is able to multiply the tonnage moved in a day, and also offers improvement in the number of deliveries between store and branch.

### Freight Delivery

There have been made by the Institute a number of studies upon the manner in which wagons in the service of hauling Boston freight spend their day. Information for this work has been collected by making a log of every movement of a selected wagon from its departure from the stable in the morning until its return at night. The results of one of these studies, covering thirteen wagon-days' performance, are shown graphically in Fig. 1, in which the length of the horizontal lines represents the percentage of the total working day, or time out of stable (average 10.7 hours) spent as designated.

### Sources of "Lost Motion"

From this plot it will be noted that the wagons spent on an average of 32 per cent. of the day at the railroad yards, one-fifth of which was delay; 25 per cent. of the day at warehouses, nearly one-half of which was delay; and the remainder of the day, or 43 per cent., on the street. Of this latter time, 13 per cent. of the day was spent in traveling to and from stable morning and evening; the time spent in traveling between warehouse and freight yard was 19 per cent. of the day, during 15 per cent. of which there was at least a partial load on the wagon. In other words, these wagons spent almost as much time in waiting for loads at warehouses (11 per cent.) as in actually carrying pay loads (15 per cent.). Approximately the same amount of time (13 per cent.) was lost in moving to and from the stable.

The average number of loads hauled between warehouse and freight yard was 3.5 per day, and the average weight per load was

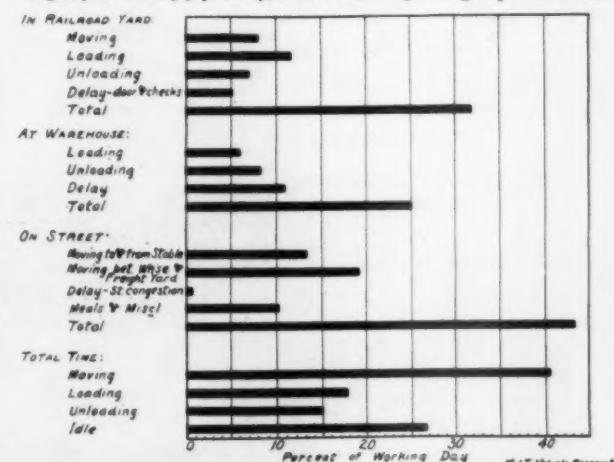


Fig. 1. Analysis of Daily Wagon Performance  
Based on thirteen days' observation of four wagons handling miscellaneous freight

1.8 tons. The total distance traveled per day was 13.5 miles, and the average length of haul was 0.9 mile.

That an enormous amount of "lost motion" exists with the present method of conducting this work is evident. The wagons are moving with a load, i. e., are performing their intended function, only a small portion of the day, and the average load is less than half that which the wagons could carry the necessarily short distances, provided the freight was collected and the business so organized that the larger loads could be obtained.

#### Cost Data

Although mechanically driven wagons possess evident advantages in rapidity and radius of movement as compared with horse-drawn vehicles, the determining factor in selecting a vehicle for a given service is usually the cost of performing this service by the three types of vehicles. It should be remembered, however, that the cost of trucking must be considered in connection with the total profits earned. An additional cost of a fraction of a cent per package may be more than offset by the increase in business due to a reputation for reliability and punctuality in deliveries.

The relative cost of performing a given service by means of the three types of vehicles depends to a very marked degree upon the nature of this service, particularly upon the loading and unloading conditions and the limitations of speed due to street traffic.

#### Study With Registers

In order to obtain accurate data upon this subject the Institute had installed on a number of wagons and trucks special recorders, which furnished tapes indicating the stops and movements of the vehicle. Arrangements were made with six representative Boston firms for the installation of these registers on their wagons, and three other local companies who were using similar registers furnished their tapes for daily analysis by the Institute.

This study included the movement of 63 vehicles, in sizes ranging from one-horse to three-horse wagons, and from 700 to 10,000 lb. motor trucks. It covered the work of each vehicle throughout from 2 to 8 months, during the winter, spring and summer of 1912. From each tape a number of observations were made with reference to moving time, standing time, speed, distance, etc.

#### Observations Recorded

A number of typical averages of these observations are given in the following table:

#### Average Performance of Six Wagons as Deduced From Tape Records

	1000-lb. Electric	4000-lb. Electric	3000-lb. Gasoline	6000-lb. Gasoline	1-Horse Wagon	2-Horse Caravan
Company	51	9	5	30	35	29
Co.'s number for truck	2	93	158	1	325	941
Service	A	B	C	D	E	F
Months of record	8	8	7	7	5	6
Miles per day	35.1	19.9	42.7	24.7	11.7	12.2
Trips per day	1.8	4.1	4.0	2.0	2.4	3.8
Stops per day	27	12	38	12	13	14
Miles per trip	19.5	4.9	10.7	12.4	4.9	3.2
Office to 1st stop, miles	2.4	1.9	3.2	3.1	1.1	1.3
Office to last stop, miles	2.7	1.5	2.8	4.1	1.6	1.7
Hours in use per day	10.3	9.2	10.8	9.7	9.7	10.1
Hours standing per day	6.4	6.4	7.3	6.8	5.7	6.1
Hours moving per day	3.9	2.8	3.5	2.9	4.0	4.0
Hours loading per trip	0.5				0.6	
Hours unloading per trip					0.6	
Hours for meals		1.0			1.3	1.1
Calls per day	11.				6.	7.2
Pieces delivered per day		40.				
Lbs. initial loads per day	8600.			7300.	29400.	
Av'ge run'g speed, long run	10.6	7.9	14.8	8.8		
Average running speed, throughout day	9.8	7.0	12.3	8.5	3.0	3.0
Days used per month	21.8	27.2	17.5	20.7	21.8	24.0
Days out of com. per month	2.4	0.2	4.8	4.6	3.1	0.0
Days ready but not used per month	6.4	3.0	8.2	5.1	5.5	6.3

The letters indicating the service have the following significance:

- A—Suburban parcel delivery.
- B—Miscellaneous hauling.
- C—Suburban baggage call and delivery.
- D—Furniture moving and miscellaneous trucking.
- E—Retail coal delivery.
- F—Outbound freight for manufacturer.

\*It will be noticed that these cases are all of the very short haul type, most suited to the electric truck. We hope the research will later include 40 to 50 mile hauls or the special field of the gas truck.—Editor.

#### Estimates

The collection of performance data as outlined above will furnish a knowledge of the fundamental characteristics pertaining to the present operation of trucking and delivery services. Knowledge of this character, coupled with the information upon the cost of the different items in operating delivery equipments as obtained from the experience of operators, will furnish a basis for estimating the comparative expenses of the three types of vehicles when operated in chosen services.

Here are given the details of five estimates, which are based upon the cost data published in Vehicle Research Bulletin No. 2. Services for which the different capacities of wagons would be adapted have been selected as follows:

- 1000 lb. rated capacity, suburban parcel delivery.
- 1000 lb. rated capacity, city parcel delivery.
- 4000 lb. rated capacity, furniture delivery.
- 7000 lb. rated capacity, beer delivery to saloons.
- 10000 lb. rated capacity, coal delivery.

The suburban parcel delivery involves a run of four miles before delivering is commenced, the territory covered being from 4 to 7 miles from the store. The city parcel service includes the area within a 4-mile circle. The conditions of the furniture, beer and coal services contemplate an area within 4 miles of the loading point.\*

#### One Thousand Pound Rating—Estimate for Suburban Parcel Delivery

Average maximum load in lbs., approximately	1000
Miles, store to delivery zone	4
Deliveries per mile in delivery zone	6
Trips per day	2
Hours per trip for loading	1.0
Minutes per delivery	1.5
Hours working per day	9

	1000-lb. Electric	1000-lb. Gasoline	1-Horse Wagon	2-Horse Caravan
Average running speed, to and from delivery zone, m. p. h.	11	15	6.5	
Average running speed in delivery zone	9	9	5	
Hours per day for loading	2.0	2.0	2.0	
Hours per day to and from delivery zone	1.45	1.1	2.5	
Hours per day in delivery zone	5.55	5.9	4.5	
Miles per day to and from delivery zone	16	16	16	
Miles per day in delivery zone	21	23	13	
Miles per day, total	37	39	29	
Deliveries per day	128	138	78	
Deliveries per mile of total day's travel	3.5	3.5	2.7	
Days used per year	285	270	285	
Miles per year	10,500	10,500	8,300	
Deliveries per year	36,500	37,000	22,000	
Expense per year—				
Tires or shoeing	\$170.00	\$190.00	\$60.00	
Repairs	300.00	550.00	125.00	
Battery	250.00			
Veterinary			10.00	
Lubricants	15.00	50.00		
Electricity at 3c. per kw. hr.	160.00			
Gasoline at 16c. per gal.		215.00		
Feed			320.00	
Garage or stable	200.00	200.00	125.00	
Driver and helper	1,000.00	1,080.00	1,000.00	
Depreciation	165.00	305.00	160.00	
Interest	60.00	60.00	24.00	
Insurance	135.00	170.00	30.00	
Total annual expense	\$2,455.00	\$2,810.00	\$1,854.00	
Cost per day	8.60	10.40	6.50	
Cost per mile	.23	.27	.23	
Cost per delivery	.067	.075	.085	

#### One Thousand Pound Rating—Estimate for City Parcel Delivery

Average maximum load in lbs., approximately	1000
Miles per trip	12
Deliveries per mile	6
Trips per day	2
Hours per trip for loading	1.0
Minutes per delivery	0.9
Minutes per stop	1.8
Hours working per day	9

	1000 lb. Electric	1000 lb. Gasoline	1 1/2 Horse Extra Horse
Average running speed .....	9.5	10.	5.
Hours per trip, standing .....	2.1	2.0	2.1
Hours per trip, moving .....	1.2	1.2	2.4
Hours per trip, total .....	3.3	3.2	4.5
Average No. of trips per 9-hour day .....	2.7	2.8	2.0
Miles per day .....	33	34	24
Deliveries per day .....	198	204	144
Days used per year .....	285	270	285
Miles per year .....	9,400	9,200	6,800
Deliveries per year .....	56,500	55,000	41,000
Expense per year—			
Tires and shoeing .....	\$180.00	\$170.00	\$54.00
Repairs .....	270.00	500.00	125.00
Battery .....	225.00		
Veterinary .....			9.00
Lubricants .....	15.00	50.00	
Electricity at 3c. per kw. hr. ....	145.00		
Gasoline at 16c. per gal. ....		200.00	
Feed .....			290.00
Garage or stable .....	200.00	200.00	110.00
Driver and helper .....	1,000.00	1,080.00	1,000.00
Depreciation .....	165.00	305.00	160.00
Interest .....	60.00	60.00	24.00
Insurance .....	135.00	170.00	30.00
Total annual expense .....	\$2,365.00	\$2,735.00	\$1,812.00
Cost per day .....	8.30	10.10	6.4
Cost per mile .....	.25	.30	.27
Cost per delivery .....	.042	.05	.045

## Estimate of Furniture Delivery

Average maximum load, in lbs. approximately .....	4000
Miles per trip .....	12
Calls per mile .....	1
Hours per trip for loading .....	0.7
Minutes per call .....	6
Hours working per day .....	9

	4000 lb. Electric	4000 lb. Gasoline	2 Horse Wagon 1 Extra Horse
Average running speed, m. p. h. ....	8	9	5
Hours per trip, standing .....	1.9	1.9	1.9
Hours per trip, moving .....	1.5	1.4	2.4
Hours per trip, total .....	3.4	3.3	4.3
Average No. trips per 9-hour day .....	2.65	2.75	2.1
Miles per day .....	32	33	25
Calls per day .....	32	33	25
Days used per year .....	285	270	285
Vehicle miles per year .....	9,100	9,000	7,150
Calls per year .....	9,100	9,000	7,150
Expense per year—			
Tires or shoeing .....	\$225.00	\$270.00	\$108.00
Repairs .....	260.00	550.00	125.00
Battery .....	270.00		
Veterinary .....			18.00
Lubricants .....	15.00	50.00	
Electricity at 3c. per kw. hr. ....	200.00		
Gasoline at 16c. per gal. ....		285.00	
Feed .....			570.00
Garage and stable .....	220.00	220.00	220.00
Driver and helper .....	1,140.00	1,215.00	1,140.00
Depreciation .....	240.00	500.00	210.00
Interest .....	84.00	96.00	31.00
Insurance .....	140.00	180.00	35.00
Total annual expense .....	\$2,794.00	\$3,366.00	\$2,457.00
Cost per day .....	9.75	12.50	8.60
Cost per mile .....	.31	.38	.35
Cost per call .....	.31	.38	.35

## Three and a Half Ton Rating—Estimate for Beer Delivery to Saloons

Average maximum load, in lbs., approximately .....	7000
Miles per trip .....	14
Calls per mile .....	0.7
Hours per trip for loading and unloading .....	0.75
Minutes per call .....	8
Hours working per day .....	9

	7000 lb. Electric	7000 lb. Gasoline	2 Horse Wagon 1 Extra Horse
Average running speed, m. p. h. ....	7	8.5	4
Hours per trip, standing .....	2.1	2.1	2.1
Hours per trip, moving .....	2.0	1.7	3.5
Hours per trip, total .....	4.1	3.8	5.6
Average No. trips per 9-hour day .....	2.2	2.4	1.6
Miles per day .....	31	33	22
Calls per day .....	22	23	15
Days used per year .....	285	270	285
Vehicle miles per year .....	8,850	8,900	6,250
Calls per year .....	6,200	6,230	4,370
Expense per year—			
Tires or shoeing .....	\$330.00	\$380.00	\$144.00
Repairs .....	300.00	625.00	125.00
Battery .....	360.00		
Veterinary .....			24.00
Lubricants .....	15.00	60.00	
Electricity at 3c. per kw. hr. ....	265.00		
Gasoline at 16c. per gal. ....		350.00	
Feed .....			760.00
Garage or stable .....	240.00	240.00	280.00
Driver and helper .....	1,210.00	1,280.00	1,210.00
Depreciation .....	290.00	610.00	250.00
Interest .....	102.00	120.00	38.00
Insurance .....	140.00	180.00	35.00
Total annual expense .....	\$3,252.00	\$3,854.00	\$2,866.00
Cost per day .....	11.40	14.25	10.00
Cost per mile .....	.37	.43	.46
Cost per call .....	.52	.62	.66

## Five Ton Rating—Estimate for Coal Delivery

Average maximum load in lbs., approximately .....	10000
Miles per trip .....	6
Hours per trip for loading .....	0.2
Hours per trip for unloading .....	0.7
Hours working per day .....	9

	10,000 lb. Electric	10,000 lb. Gasoline	3 Horse Wagon 2 Extra Horses
Average running speed, m. p. h. ....	6	7.5	3
Hours per trip, standing .....	0.9	0.9	0.9
Hours per trip, moving .....	1.0	0.8	2.0
Hours per trip, total .....	1.9	1.7	2.9
Average No. trips per 9-hour day .....	4.7	5.3	3.1
Miles per day .....	28	32	18.5
Tons delivered per day .....	23.5	26.5	15.5
Days used per year .....	285	270	285
Vehicle miles per year .....	8,000	8,600	5,300
Tons delivered per year .....	6,700	7,150	4,400
Expense per year—			
Tires or shoeing .....	\$400.00	\$520.00	\$175.00
Repairs .....	300.00	700.00	100.00
Battery .....	440.00		
Veterinary .....			30.00
Lubricants .....	15.00	70.00	
Electricity at 3c. per kw. hr. ....	290.00		
Gasoline at 16c. per gal. ....		430.00	
Feed .....			900.00
Garage and stable .....	270.00	270.00	335.00
Driver and helper .....	1,210.00	1,280.00	1,210.00
Depreciation .....	400.00	760.00	300.00
Interest .....	135.00	150.00	45.00
Insurance .....	150.00	200.00	40.00
Total annual expense .....	\$3,610.00	\$4,380.00	\$3,135.00
Cost per day .....	12.30	16.20	11.00
Cost per mile .....	.45	.51	.59
Cost per ton delivered .....	.54	.61	.71

## Comparative Expenses

From the above estimates the columns of comparative expense given in Fig. 2 have been plotted.

The expense items have been grouped under two heads of (1) Electricity, gasoline or feed; (2) Maintenance; (3) Garage or stable; driver and helper; (4) Overhead, including depreciation, interest and insurance. The expense per mile has been used as the basis of comparison in this figure in order to show the relative magnitude of the several heads of expense. It will be noted from

the cross hatching of the columns that the cost of electricity and gasoline is only from 6 to 10 per cent. of the total expense of operating a car, whereas the labor charges for driver and helper is from 30 to 40 per cent. of the total. With regard to horse

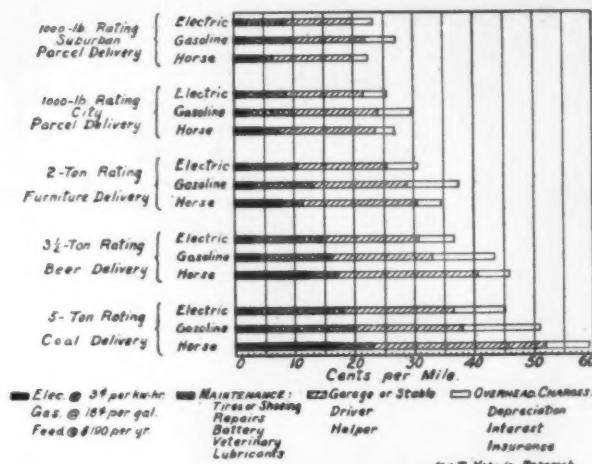


Fig. 2. Estimates of Comparative Expense for Specified Services

wagons the cost of feed is from 20 to 30 per cent., and the cost of driver and helper from 40 to 55 per cent. of the total. These figures serve to indicate the importance in operating an equipment of carefully considering the labor question. The relatively small value of the cost of "energy," i.e., electricity, gasoline or feed, is also pointed out.

#### Conclusion

In considering these comparisons it will be noted that for the light cars, such as the 1000-lb. rating, the superiority of the automobile over the horse wagons in so-called suburban service is extremely marked. This is work where hauls of considerable length exist between the points of loading and of beginning distribution. It will also be noted that in a limited territory, such as within a 4-mile radius of a loading point, the superiority of the motor cars over horse wagons increases to a marked extent with the size of the load.

The above conclusions are not applicable to all classes of work of the types considered, but only to those cases where the characteristics are similar to the assumptions upon which the estimates are based. The specific services selected are particularly suited for electric trucks. Other services, particularly where the distances traveled per day are in excess of 45 miles, would in many cases show a decided advantage in favor of the gasoline truck, while for very small daily distances, 15 miles or less, the horse wagon would undoubtedly prove the cheaper. It must, however, be borne in mind that each change in service requirements will produce a corresponding change in the cost of performing the service. In other words, service requirements are as important a factor in determining costs as the type of the vehicle selected.

#### GENERAL VEHICLE COMPANY RECEIVES LARGE ORDER

That the New York Railways Company believes it has found a solution for the shortcomings of horse-drawn wagon service is evidenced by the \$100,000 order for electric commercial vehicles placed with one company recently.

The order calls for the following machines:

- 1 1000-lb. wagon with express type body.
- 2 1000-lb. wagons with panel bodies.
- 1 2000-lb. panel money wagon.
- 5 4000-lb. emergency wagons.
- 14 7000-lb. trucks with steel dumping bodies with hand operated dumping devices.
- 4 7000-lb. trucks with platform and stake bodies.
- 2 10000-lb. trucks with platform and stake bodies.

It will be noted that with the exception of tower wagons and pump wagons, which will doubtless be utilized later on, practically all special applications of the modern electric truck will be utilized in this representative installation. The 1000-lb. wagons will handle special package deliveries, and the money wagon is a type already used by the express companies and banks. The 7000-lb. dumping trucks are understood to be the last word in design and operating efficiency, although the dumping devices are hand operated. The other 7000-lb. trucks will be used in general hauling, and the 10,000-lb. trucks, equipped with windlass, are probably intended for cable work.

## Factory of the Schwarz Wheel Company

Margaret Street and Pennsylvania Railroad, Frankford, Pa.



Where Wheel Spiders Are Assembled

Two departments of the Schwarz Wheel Company's large factory. This company has never built anything but motor car wheels, and their output of commercial car wheels is probably larger than that of any factory in the world. The patent spoke construction of the Schwarz wheel is the feature which has made its tremendous reputation for strength.



Applying Metal Rims

## A Comprehensive Installation

**Gasoline and Electric Trucks Used by a Well-Known Brewing Company Displace More Than a Thousand Horses—A Well-Equipped Repair Shop Keeps the Machines in Constant Service—Former Horse Drivers Taught How to Run Commercial Cars**

BY C. B. HAYWARD

 HAT is probably the largest single installation of commercial cars maintained by a manufacturing concern, that is, one not making a business of transportation, is that of the Anheuser-Busch Brewing Association of St. Louis. It consists of some 64 electric vehicles and 25 gasoline trucks, all of which are in constant use. Contrary to what might appear to be the case in view of the close attention to detail and the planning that marks the carrying on of such a tremendous business, this impressive fleet of commercial cars has not been

has been taken care of by the purchase of new motor equipment. There are about one hundred horses still in service and the room required for their housing is in excess of twenty-five per cent. of that needed to provide storage and repair facilities for motor trucks representing a delivery service that would require almost a thousand horses to maintain.

### The Equipment

Of the total equipment, 56 electric trucks and 10 gasoline trucks are employed at the home plant, and the number both



**The Anheuser-Busch Garage, St. Louis, Mo., Showing Separate Doors for Entrance and Exit**

brought together according to any preconceived system, nor has any close system of cost accounting, showing the superiority of motor transportation over the horse, been responsible for its great growth. The motor truck has been recognized as an improvement over former methods of haulage, and has been adopted on the same basis as any other improvement. To quote the manager of this big installation, George H. Thorpe, "the cost of taking care of the increase in business during the past eight years with horses would have been almost prohibitive. The motor truck appeared when it was most needed."

The first step away from methods of delivery, that were recognized as obsolete even at that early day, was the purchase of six Pope-Waverley 1½-ton trucks in 1904. At that time, several hundred horses were necessary to maintain the delivery system, and their housing required almost as much room and more expense for labor and feed than the present day equipment of commercial cars, that does several times the work and does it more efficiently and economically. Every year since then the number of motor trucks has increased and the number of horses decreased in proportion. The total increased demand upon the delivery facilities of the big brewery and its numerous branches during the past eight years,

for home and for branch service is constantly being increased. There are 26 General Vehicle five-ton electrics, four of which were added recently, the same number also being purchased in 1911. Other recent additions to the installation have been eight three-ton Packard trucks in 1910, one five-ton Peerless in 1911 and one two-ton Packard express wagon in 1912. The remainder of the electrical equipment at the brewery consists of twelve Waverley 1½-ton trucks with 50-case panel bodies, twelve more of the same type and make with stake bodies, two Columbia 1½-ton stake trucks, two five-ton Couple-gear trucks, one three-ton and one two-ton Couple-gear machines, all of these having been in service from four to seven years. At the New York branch there are eight five-ton General Vehicle electrics and two three-ton Packard gasoline trucks. All of the other branches are equipped with three-ton Packards to the total of about twenty-five trucks. The purchasing of all this equipment is done through the home office and only the stripped and unpainted chassis is bought from the manufacturer. A complete body plant and paint shop is maintained and all chassis are fitted for service of the brewery, whether intended for local or branch use.



**Anheuser-Busch Repair Shop**

On the left are seen pits, over which trucks are suspended for repair purposes. The forge is in the background and overhead is a trolley. Parts of the dismantled truck are lying about, the rear wheels and axle and spring assembly most prominent. A Packard truck, ready for use, is in the center of the floor.

#### Electrics Used For Local Deliveries

The fact that at that time (1904) no attempt was made of distant hauling, but simply to take care of the local delivery, with the aid of the delivery service, also influenced the choice of electrics. There was no particular necessity for a high daily mileage. Even now the entire city service is comprised within a radius of five miles from the brewery, and the average daily mileage of the electrics, both large and small, is but 30 miles. As an illustration of what the electric is capable, however, one of the big General Vehicle five-ton trucks recently made the trip from the brewery to the Busch farm with a load and returned, covering the total distance of 62 miles on one charge of the battery. This is an excellent performance for a five-ton electric, and is far in excess of what a vehicle

of this type would ordinarily be called upon to do in everyday service. On the occasion in question, none of the gasoline cars were available so that the electric was pressed into use and ably demonstrated its ability. Under ordinary conditions, these big electrics do not have to travel more than twenty-five to thirty miles a day, or about twice the distance covered by a three-horse truck in a day of ten hours.

#### Teamsters as Drivers

All the drivers are former teamsters who have been in the employ of the brewery for a number of years, and all show equally good records in handling both the electrics and the gasoline machines, so that the greater simplicity of operation of the former has not been a deciding factor in its favor to any great extent.



**Machine Shop of the Anheuser-Busch Garage**

On the right can be seen the pits, for use in making repairs or overhauling. A machine can be seen in process of reconstruction. In the background can be seen the engine, lathes, miller, shaper and drill presses, and overhead is located a trolley, with differential pulley, for handling heavy articles



Charging Panels and Battery Repair Room of the Anheuser-Busch Garage

#### Battery Care

To keep this large fleet of electrics at a high pitch of efficiency, a compact but most complete battery plant is maintained. Upon returning from its day's work, the truck is returned to its particular "stall" on the garage floor and the battery is withdrawn on a hand truck and wheeled over to the charging department, which is a room separate from the panel boards and is especially ventilated, the hydrogen gas escaping through a large vent in the roof. Current is furnished from the brewery's own plant, at a cost probably well below one cent a kilowatt hour, and a large number of batteries may be placed on charge simultaneously. All batteries are of the 44-cell size, only differing in capacity in accordance with that of the truck and ranging from 15 to 29 plates per cell. For instance, the 1½-ton trucks carry 15, 17 and 19-plate cells, and the five-ton 19 to 29-plate cells. This part of the equipment consists principally of Exide cells, with some National and some Gould. Recent additions have been of the Exide Iron Clad type, while many of the older cells are of the Hi-Cap style. In fact, 75 per cent. of the total battery equipment is of Exide make. From twelve to fifteen complete batteries are always kept on hand for emergencies, and to replace those

withdrawn from service for inspection or repair. To maintain these batteries two men are employed. New positive and negative plates are purchased and assembled instead of buying replacements ready for use. This results in a double economy as the assembling can not only be done at a saving, but it is frequently possible to utilize old negatives with fresh positive plates, thus obtaining the maximum life from the former.

#### Complete Stock of Repair Parts

To provide for all emergencies on the mechanical end, twelve to fifteen complete motors, and fifteen extra armatures are carried as replacements, in addition to a stock of repair parts and supplies for both electric and gasoline cars, that would do credit to the service station of a large automobile factory. This stock includes replacement wheels, ready equipped with tires, for every type of vehicle used.

The gasoline trucks take care of all the more distant deliveries at the home plant, and with the exception of New York, are used almost exclusively at the branches, Packard three-ton trucks being employed for this service. They cover a radius of about thirty miles on the Missouri side of the



Interior of the Spacious Anheuser-Busch Garage, St. Louis, Mo., Which Houses a Large Fleet of Both Gasoline and Electric Cars

river and average about 60 to 65 miles per day. While purchases of new equipment comprise both electrics and gasoline cars, the latter are increasing faster, so that it will be only a few years before both types will be about on an equality where numbers are concerned.

Despite the range of capacities of the vehicles employed, comparatively few different sizes of tires are used, consisting chiefly of 36 x 4 and 36 x 5 in. solids, with the Kelly-Springfield block type on the Packards, these being 36 x 5 in. single front and the same size dual rear. About 60 per cent. of the total tire equipment is of Firestone make, the remainder consisting of Goodyear, U. S., Goodrich and the Kelly-Springfields just mentioned. The average tire mileage is about 9,000 miles, or about one year's continuous service on an electric, counting 300 working days with an average of 30 miles per day as



**Battery-Charging Room**

Here are shown a group of batteries in process of charging. The charging leads hang from the ceiling, and are amply long to be conveniently attached to batteries at any point within the room. Note the ease with which these heavy units can be handled, by the use of hand trucks.

equivalent to a year's work. The daily consumption of fuel is about 300 gallons, but this also includes the demands of the twenty-two pleasure cars that are kept in the same garage for the convenience of the officers of the company. Storage capacity for 10,000 gallons of gasoline and 600 gallons of oil is provided, the consumption of grease totalling close to three barrels a month.

#### Repair Shop and Washing Pits

To keep this large installation at a high pitch of efficiency, a complete repair shop is maintained. Its equipment consists of two American engine lathes, a B & S Universal miller, an American shaper, an American radial drill, a drill press, power hack saw and wheel press. An ingenious form of pit has been provided, consisting of a large opening in the concrete floor, spanned by two structural steel beams laid flat. On the latter the machine is run over the pit, allowing unusually free access to it as well as plenty of daylight. There are several of these pits in the repair shop, while there is a "washing pit" in the garage proper, this being an innovation, the importance of which can be appreciated upon noting that by its aid the hose and sponge can be as easily applied to every part of the underbody, as they are to the upper works. This pit saves considerable time in the process of washing such a large number of

trucks, and also insures their being clean where cleanliness counts most, around those parts of the mechanism that get most of the splash and mud, but that are ordinarily hardest to clean because of their inaccessibility.

While no particular effort has been made to keep a system of cost accounting which would permit of comparison between the commercial cars and the small number of horses still in service, nor which would show definitely just how much it cost to run each type of vehicle per mile or per day, an effective system of keeping the entire fleet in commission is in good working order.

#### Yearly Overhauling

Every truck receives a thorough overhauling once a year, usually in the fall. It is taken down completely, one of the big five-ton gasoline trucks appearing in this condition in the photograph of the repair shop. Every part is carefully examined and all needing renewal are replaced, it being a fact worth mentioning in this connection, that Mr. Thorpe has found it much more economical to cut his own replacement sprockets and gears for both electric and gasoline trucks, than to buy such parts as replacements from the makers. Every one of the cars is painted at least once in two years, the months of December and January being utilized for this purpose, as then the demands upon the equipment are lightest. In addition to the annual overhauling, every truck is inspected carefully every night upon finishing its usual daily task.

Taking the total from one year's end to the other, not more than three per cent. of the entire equipment, on an average, is in the repair shop at any one time, while the necessity for towing a car home is comparatively rare. In fact, during the year just past there were only three cases of what might be termed breakdowns. In one case, a gasoline truck was driven into a street excavation, while on another occasion a gasoline truck broke its driving shaft, and in the third, an electric was disabled by breaking a motor hanger. With the electrics, the chief causes of breakdown are electrical in their nature, usually taking the form of short circuit, from a piece of metal falling on the cells, or from a broken battery strap, due to the jolting and vibration. About once a month one of the drivers of an electric will telephone in for a tow home owing to the battery having given out.

#### DEER HUNTING BY MOTOR TRUCK

Down in Waco, Tex., during the last deer season, a Federal truck was utilized in conveying camp outfits and hunters to and from the mountains, and in bringing in the deer.

The truck successfully brought back its original lot, together with the fifteen deer, to Waco. The sportsmen are positive that the motor truck can be used to better advantage and a saving in time and money over teams and spring wagons, when it comes to hunting big game.

PIONEER MOTOR TRUCK CORPORATION has been organized in San Francisco, Cal., with \$500,000 capital. The new company will act as Pacific Coast agents for the General Motors Truck Company. E. P. Brinegar is at the head of the new company.

**The Truck: "When I did well, I heard it never;  
When I did ill, I heard it ever."**



## How Automobile Springs Are Tested

BY E. F. LAKE

**F**ROM the machines that have recently been built for testing leaf springs, or parts of them, and the apparatus that is being devised for this purpose, it would seem as though the spring had been left for the last part of the car to be given a thorough testing. And yet, the spring is one of the vital parts of the car, whose physical properties should have been thoroughly known ere this. If they had, automobile engineers would have insisted that springs be more uniformly hardened and tempered at more accurate temperatures, than is the case at present, and also that the spring plates be not overheated when forming them to shape.

This overheating and inaccuracy or non-uniformity in the hardness or temper of springs destroys a large part of the physical properties that are inherent in steel and which should be developed. The proper tests always reveal this and shows what springs are reliable and what are not up to standard. One of the chief components of the physical properties is the elastic limit of steel and this is an important factor in designing springs. Thus, when springs are overheated in the working and not properly hardened and tempered, the elastic limit will be considerably lower than it should be.

It is therefore necessary to design the spring heavier than would be the case if the maximum elastic limit was developed that was inherent in the metal. What has saved many designers from utter failure, is the fact that the modulus of elasticity does not change with any kind of heat treatment, but always remains constant at 28,000,000. Thus springs with a low elastic limit will carry the load, providing the stresses, to which they are subjected, do not exceed the elastic limit of the plates. Even thoroughly annealed steel will carry some load. In such a case, it is only necessary to make the plates heavy enough or pile enough leaves on top of one another to keep the stresses below their low elastic limit.

### Quench at Twenty Degrees Centigrade Above Transformation Point

This, however, is only assembling conglomerated masses of steel plate and misnaming them springs; but it is too often done. There is very little resiliency to such masses, as resiliency is greatly increased by correct heat-treatment. The greatest resiliency is obtained by heating steel just 20 deg. C. higher than the transformation point and then suddenly

quenching it in oil. After that spring plates must be reheated to from 375 deg. to 450 deg. C. and slowly cooled, to remove the extreme brittleness that they have in the hardest state. Any deviation from these temperatures decreases both the elastic limit and the resiliency, and also the steel's resistance to the alternating stresses that are caused by a spring's deflections.

This latter is forcibly illustrated by the chart fig. 1. One hundred test pieces were cut from the same bar of spring stock and ten of these were hardened at each of the temperatures shown to the left of the chart. They were then given the alternating vibrational test, after being tempered, by gripping one end in the vice of a machine and setting the slide so it would deflect each specimen  $\frac{1}{2}$  in. each way from the center and 6 in. away from the vice. Thus in 6 in. of length, the test piece was deflected a total of 1 in. The number of deflections was recorded that each specimen withstood before breaking and the curve in the chart was plotted from the average of the ten pieces in each set.

This being the movement that a spring leaf gets, it truly shows the comparative life of springs when hardened at different temperatures. There was but little variation in the ten pieces in each set, but the different sets showed a wide variation. This proved that the steel was uniform in composition and that the hardening and tempering were accurately done, but that a variation in the hardening temperature made a great difference in the life.

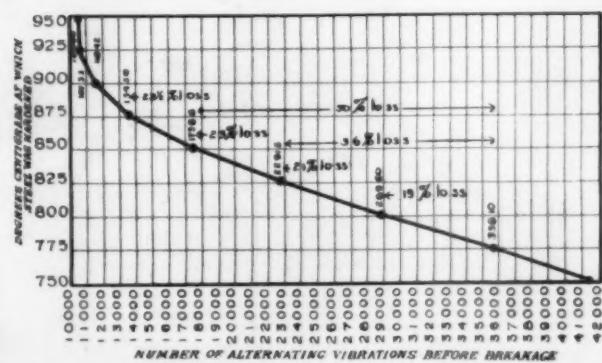


Fig. 1. Fatigue Test on Specimens Hardened at Different Temperatures and Drawn at 400° C.

### Permanent Set in Springs Hardened at Low Temperatures

The pieces hardened at 750 deg. C. took a permanent set when deflected in the machine, which proved that the temperature was too low and such springs would settle. Those hardened at 775 deg. sprung back after each deflection and this proved to be the hardening temperature that would give the longest life without a settling. As the transformation point of this steel occurs at 755 deg. it proves the former statement, that steels must be quenched from 20 deg. above their transformation point to give them the greatest resiliency.

When the samples were heated at 800 deg., or 25 deg. too high, 19 per cent. of their longevity was sacrificed. When heated 50 deg. too high, 36 per cent. of their resistance to deflections was removed, and when heated 75 deg. too high,  $\frac{1}{2}$  of their life was destroyed. The cause for this is that a gradual coarsening of the grain takes place with each increase in temperature above the transformation point. This coarsening of the grain weakens the cohesive force that binds the molecules together into a solid mass.

With all of the apparatus that is now available it is not difficult for manufacturers of motor cars to conduct tests that prove whether, or not, springs have been overheated in the working, or uniformly and accurately hardened and tempered. The tensile testing machine, which gives the elastic limit, tensile strength, elongation and contraction, is too well known to comment on at this time. It is valuable for obtaining the elastic limit of the various steels that are made up into springs. The contraction is also an important factor, as from it an estimate of the toughness of steel can be obtained. The tensile strength and elongation are not of much importance in spring tests. But when the elastic limit is up close to the tensile strength it indicates a tough long-lived metal; as also does a low elongation in conjunction with a large percentage contraction. A high elastic limit with a large contraction, however, is a better indication.

The cold bend testing machine is also well known. This will show how many degrees a spring leaf can be bent before breakage occurs. Many leaves will bend double around a 1 in.

pin, which means they are too soft. Others will only bend a few degrees before breaking and this means they are too hard and brittle. If the elastic limit of the cold bend is shown by the machine it makes a much better test, as what a leaf will bend after the elastic limit is passed, is valueless as an indicator of the useful properties of the metal.

### How to Test for Uniformity of Heat Treatment

Tabulating the number of degrees that different leaves will bend up to the point where they take a permanent set, will enable one to quickly judge when a lot of springs have not been uniformly heat-treated. This test is only good for comparing a lot of springs that are made from the same kind of steel, as the amplitude of toughness is not the same in all steels. Often a wide difference is found in the same spring, or even in different parts of the same leaf. This means, either that the grain was coarsened in some parts of the leaf, or spring, by overheating, or that the hardening temperature had a wide variation in different parts.

Machines that test a whole spring, or a single leaf, have recently been placed on the market by Tinius Olsen & Company, Philadelphia, Pa. A machine is shown in fig. 2 that gives the load carrying capacity and the amount of deflection. When the spring is located on platen A, as shown, the platen is raised by hand wheel B and screw C, until it presses against block D. This starts weighing the load upon the spring and dial E indicates the pounds of pressure that is applied. The platen can be raised and lowered by power, shifting lever I controlling the power. At the first pound of pressure, the pointer on dial F is thrown into action by lever H. This records each hundredths of an inch of deflection; once around the dial being 3 in. Hence, the load that the spring will carry for each in. of deflection, or fraction thereof, can be instantly read from the two dials. This test is not in any way destructive to the spring and tests can be made quite rapidly. If desired, each spring could be tested before it is put into the car to see that it would carry the required load without settling, or that it would not break when deflected the maximum amount.



Fig. 3. Vibratory and Deflection Spring Testing Machine

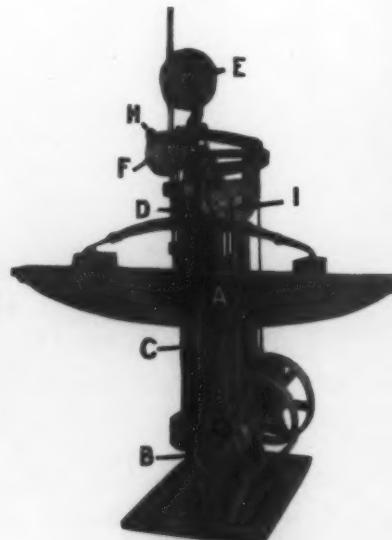


Fig. 2. Deflection Spring Testing Machine

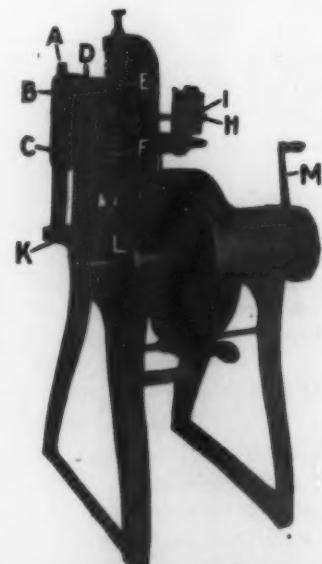


Fig. 5. Toughness and Fatigue Testing Machine

### Life and Death of Steels

Steel, like all other things, has its life and death. We put all the science, skill and ingenuity that is possible into its manufacture to make a dense, homogeneous metal. Yet, in time, we find a weakening and finally a cessation of the cohesive force that binds the molecules of the mass together. There are many causes for this, but the one that most vitally affects springs is the alternating vibrations to which they are continually subjected. We can bend or deflect a spring far enough at one time to overcome the cohesive force and cause the metal to break. In this case, however, we have exceeded

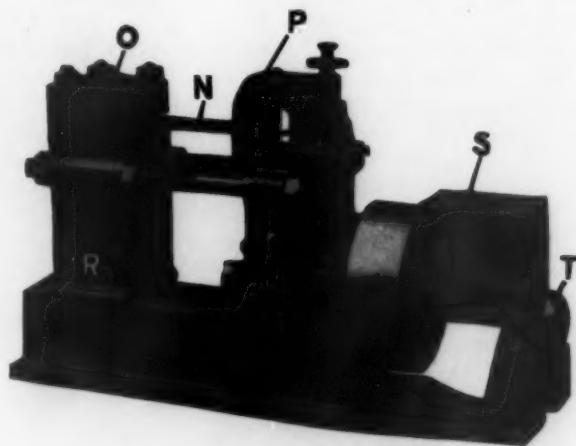


Fig. 4. Vibratory Testing Machine

the elastic limit of the steel. Springs should be so designed, formed and heat-treated that any stresses they might receive, would not go beyond the elastic limit. The alternating vibrations, however, are caused by rapidly repeating stresses that are way below their elastic limit in their intensity. Yet, if these are continued long enough, they cause the cohesive force to cease its exertion and a rupture to occur.

To prolong the life of the steel is, therefore, the big problem in spring making. The making of the steel is one factor, as well-made steels have a greater longevity than those carelessly made. Steels made in the electric furnaces are longer lived than those made by other processes, as the nitrogen, oxygen, phosphorus, sulphur and other impurities, that weaken the cohesive force, are reduced to lower percentage. Crucible steels come next, with open-hearth steels third and Bessemer steel last. If open-hearth steels are made in 10 ton furnaces, they are much better than when made in 35 ton or 60 ton furnaces, as a greater percentage of the impurities are removed. Alloying materials are also used to remove the impurities and refine the grain, and the alloy steels useful for springs, are longer lived than the ordinary carbon steels if properly heat-treated.

After securing a good steel for making into springs, the next, and by far the most important, factor to consider is the heat-treatment the spring plates receive in the spring shop. Improper heat-treatment can weaken them so much that the life of the spring is entirely destroyed and it will withstand but few alternating vibrations. Whereas, the correct heat-treatment will develop all the latent strengths that are inherent in the metal and then springs should wear, or live, as long as the automobile, without settling.

### Alternating Vibration Tests

To test the alternating vibrations that springs withstand, the machine shown in fig. 3 was built. This machine will give the load carrying capacity and the deflection the same as the machine in fig. 2, but in addition to that it will alternately deflect and release the spring until a breakage occurs. This was accomplished by adding enough mechanism to the machine shown in fig. 2 to cause the platen to continuously move up and down. Similar letters show similar parts in both cuts.

To conduct the alternating vibrational test, platen A is raised until block D presses hard enough against the spring to put upon it the load it will carry when in use on the car. Then, with hand wheel J, screws K, K are raised firmly against the bottom of platen A, and screw C is lowered enough to be out of the way. By starting the motor and using lever L, to throw in a clutch, the machine will then operate the platen without any further attention, except to watch for the occurrence of the breakage. The movements of the platen are registered on counter M and this gives the number of alternating vibrations that the whole spring will withstand. A single leaf could be tested in the same manner but the data obtained would be of little value as each leaf of a spring is a different length and a different camber. Any shape or size of spring can be deflected any distance that is required.

While this test destroys springs it is very valuable for determining how long they should last, as the stresses are the same as they get when in service. In testing but one spring, an exceptionally good one, or poor one, might be selected and hence a false valuation be placed on the lot. Sample springs should never be tested for reliable data, as they are no criterion of what the commercial stock will be when delivered.

Testing several from the same lot of commercial springs will enable one to determine as to the uniformity and reliability of the springs received and might spur the spring makers on to more accurate workmanship and apparatus. In many instances this test has shown springs made of high grade alloy steels to be shorter lived than the ordinary carbon steel springs. This, however, is entirely due to poor heat-treatment, as any of the alloy spring steels should show at least 50 per cent. more alternations, while some should more than double the carbon steels.

When it is desirable to test various parts of the leaves of the same spring to see that there is a uniform longevity throughout all parts, the machine shown in fig. 4 is very useful. This is a small cheap machine that can be set on a bench and a number operated from a shaft, either over or under the bench. It is also useful for conducting a series of tests to determine which are the best hardening and drawing temperatures. It will hold any specimen under 2 in. wide and has a maximum length of 8 in. between the clamp and the slide.

Here, the alternating vibrations are given the specimen N by clamping it solid under block O and moving slide P up and down to deflect that end. The length of specimen, that is subjected to these vibrations, is governed by moving pillar block R, in and out. The number of the alternations is registered on counter S and when the specimen breaks bell T rings until turned off.

With the machine shown in fig. 5 tests can be completed in from 5 to 60 minutes. The pounds stress that is applied when bending the specimen can also be computed. This machine will test specimens up to  $\frac{1}{4} \times 1$  in., but a larger machine could easily be built that would test whole spring leaves. It can be driven by power from 100 to 600 r. p. m.; while the hand crank M will drive it about 100 revolutions.

The specimen A is clamped in jaws B and C and any length of specimen that is desired can be left between the two jaws; 1-10 of an in. gives good results. Jaw B is pivoted on a pin and the specimen moves it, together with arm D which works against springs E and F. Arm D in turn moves pencil holder H and the pencil makes a record like that shown in fig. 6, on chart I; the drum revolving once for each 300 revolutions

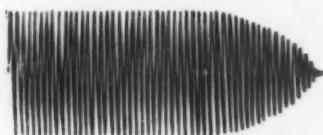


Fig. 6. Diagram Made by Pencil on Chart (Fig. 1.)

of the crank shaft. Jaw C is tilted forward and backward, to bend the specimen, by connecting rod K and variable-throw crank disc L.

From the length of the arm on jaw C and the throw of crank disc L, can be figured the angle of bend that is given the specimen. From the strengths of springs E and F, the lever arm D, the travel of pencil H on chart I, as shown in fig. 6, and the section dimensions of the specimen, the nominal maximum stress of the transverse loading cycle can be computed. A counter could also be connected to register the number of alternations before breakage occurred. For practical tests the average figures obtained by running two or more pieces each, with a 1, 1/4 and 1/2 in. crank throw, would give good results.

#### No Standard Fatigue Test

Fatigue, or alternating vibrational tests are separate and distinct from tensile tests. So far, any relations between the two tests have not been discovered. Neither is there any standard or approved method of making fatigue tests. Consequently, there is hardly any comparable data at hand. Therefore one would have to establish as many constant factors as

possible, when using this machine, and accumulate enough data to make comparisons between different steels or between specimens of the same steel, heat-treated differently.

In fatigue tests, weakness in the steel begins by single crystals starting to slip past one another. This increases the stress on the remaining crystals and others start this shear slippage, then others, and so on until a slip plane is established clear across the specimen. As they slip they pull away from the other crystals and thus destroy the cohesive force that binds them together. When all the crystals have slid past the ones to which they were attached, a break occurs in the specimen.

Only a very slight deformation of the crystals takes place, if any, and there is no necking down or reduction of area, as in tensile tests.

Fatigue fractures show, by the naked eye or through the microscope, the original size and shape of the grain. If crystallization is there it was caused from the working or heat-treatment that the steel received in its manufacture. It is a mistaken idea to think that crystallization can be caused by the vibrations that a spring receives in service. Examinations of stressed and unstressed parts and numerous fatigue tests have always proven that crystallization does not occur from these vibrations. The metal was originally bad or the break would not show a crystallized grain. The proper heat-treatment and mechanical working of steel always refines the grain and a fine grained steel will give much better results under a fatigue test than one that is not.

The microscope is also a great aid in revealing whether or not steel has been properly worked and heat-treated. Different temperatures at which steel may be heated for hardening and tempering will show under the microscope by the different structures, that crystals form. Crystallization is plainly seen. If the quenching bath is too hot it is shown by the structure. The slippage of crystals past one another can also be seen. The carbon content of the steel can be judged, as well as many other things. These magnified structures can all be photographed to preserve a record of the desired examinations.

#### MOTOR DELIVERY FOR PARCELS POST

For the collection and distribution of mail, the United States government will employ motor cars in localities where collection stops are few and far between, a motor car being far more efficient than a horse and wagon. In such cases, it has decided to allow the carrier to buy a motor car, for which he will be allowed a sum more than ample for maintenance and repairs.

Several Studebaker "20" delivery wagons are already in satisfactory service in Pittsburgh, Pa. Other cities are being added to the approved list and prospects indicate that, before the passing of many months, not only the suburban, but the rural routes as well will be, to a large extent, motor-delivery equipped.

The addition of the parcels post will also greatly multiply the number of motor cars with the sign "U. S. Mail" on their panels. Delivery and collection of the parcels will be by motor cars in all the big cities, the government making contracts for the service. To a great extent, the work of mail collection and delivery must be done by light wagons, capable of making almost touring car speed on a small consumption of gasoline and oil. Another requisite is ample cooling capacity, for the cars must be able to stand at the curb with motors running, for periods of varying length.

A limited number of larger trucks may be profitably used between the postal sub-stations, but the main part of the work will have to be done by the smaller rigs.



Getting Ready For Parcels Post

Studebaker "20" delivery wagon in suburban service of Pittsburgh Post Office. Cars of this type will be widely used for the collection and distribution of the new parcels post.

## An Analysis of Comparative Trucking Costs

The following report on "Trucking Costs" was compiled by Walter M. Curtis, member of the American Society of Mechanical Engineers, and Manager of the Engineering Department of the New England Audit Company, for one of their clients.

The problem has been so ably handled and the analysis so complete that we have deemed it of interest to our readers.

The advent of the motor truck into the transportation field has led to a more careful investigation into the cost of transporting goods and material than has been customary in the past outside of the railroads and other long distance transportation companies. The advantage of the motor truck over the horse drawn vehicle for much of the delivery and trucking service has been established and there is gradually accumulating a considerable amount of data, more or less reliable, on the cost of hauling. An examination of a considerable amount of this data brings out the following facts:

(1) The great advantage of using hauling units of large capacity whenever the nature of the load makes a large tonnage practicable.

(2) The fixed charges form a considerable portion of the total cost in the case of the motor truck.

(3) A reduction in cost per ton mile with an increase in the daily mileage.

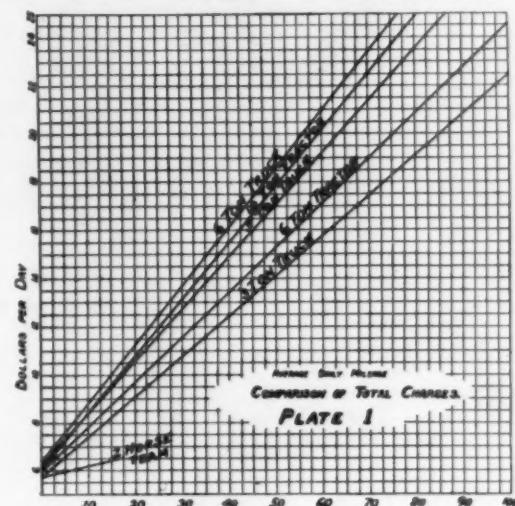
(4) The importance of eliminating "idle time" in reducing the cost per ton mile.

(5) That tire expense is a large direct operating charge in the case of the regulation motor truck.

The practical tonnage limit per unit is soon reached with horses, as a large number of horses do not work as well together and the pulling power does not increase in

ratio to their number. Thus we have a usual limit of four horses for common trucking and the two-horse hitch on contracting work.

Heavy starting stresses, stiff springs and other conditions encountered with the larger sized motor trucks are



such as to add to the complexity of construction, the first cost and the depreciation of the driving mechanism in excess of the increased tonnage secured.

With the Knox-Martin Tractor the load is not carried on the tractor springs and the starting shock is reduced by

TABLE A — Contracting Job — Large contract, loading from chutes, special dumping bodies, 2 mile haul

A—HORSES		B—TRUCK		C—TRACTOR		D—TRUCK AND TRAILER		E—TRACTOR AND TRAILER	
8 two horse teams, 4 trips per day		1 Six ton truck with 3 cu. yd. body		1 ten ton tractor, with 8 cu. yd. body		1 six ton truck, and 1 trailer with 3 cu. yd. bodies		1 ten ton tractor, and 1 trailer with 8 cu. yd. bodies	
Investment —		12 trips daily		12 trips daily		10 trips daily		10 trips daily	
16 Horses at \$350. each	\$5,600.	Investment —	\$6,000	Tractor Wagon	\$3,750. 450.	Investment —	\$6,000.	Tractor Wagon Trailer	\$3,750. 650. 900.
8 Wagons at \$300. each	4,800.			Total	\$4,600.			Total	\$5,500.
Total	\$9,400.								
CHARGES (per year)		CHARGES (per year)		CHARGES (per year)		CHARGES (per year)		CHARGES (per year)	
Interest	\$ 400.	Interest	\$ 273.	Interest	\$ 218.	Interest	\$ 303.	Interest	\$ 256.
Insurance	270.	Insurance	241.	Insurance	221.	Insurance	250.	Insurance	234.
Depreciation, horses	672.	Driver	1,092.	Driver	1,092.	Driver	1,092.	Driver	1,092.
Drivers	6,000.	Garage	300.	Garage	300.	Garage	300.	Garage	300.
Stable	6,150.	Total fixed charges	\$1,940.	Total fixed charges	\$1,823.	Total fixed charges	\$1,948.	Total fixed charges	\$1,982.
Total fixed charges	\$11,492.	Depreciation	\$785	Depreciation, tractor	\$ 482.	Depreciation, truck	\$726.	Depreciation, tractor	\$402.
Maintenance, horses	8760.	Gasoline	960.	Depreciation, wagon	245.	Depreciation, trailer	144.	Depreciation, wagons and trailer	420.
Maintenance, wagons	384.	Oil & Grease	152.	Gasoline	1,047.	Gasoline	873.	Gasoline	960.
Depreciation, wagons	384.	Maintenance	576.	Oil and grease	399.	Oil and grease	175.	Oil and grease	192.
Total operating charges	\$1,536.	Total operating charges	\$3,463.	Tires	720.	Tires	625.	Tires	660.
Total operating charges	\$1,536.	Total	\$5,349.	Maintenance	432.	Maintenance, truck	488.	Maintenance, tractor	429.
Total	\$13,130.	Total	\$5,349.	Total operating charges	\$3,135	Maintenance, trailer	120.	Maintenance, trailer	120.
Total	\$13,130.	Total	\$5,349.	Total	\$4,988.	Total operating charges	\$3,343.	Total operating charges	\$3,388.
Total	\$13,130.	Total	\$5,349.	Total	\$4,988.	Total	\$3,343.	Total	\$3,388.
Total earth hauled—24,000 cu. yds.		Total earth hauled—12,000 cu. yds.		Total earth hauled—20,000 cu. yds.		Total earth hauled—21,000 cu. yds.		Total earth hauled—20,000 cu. yds.	
Ton miles—44,000 (assuming 1 cu. ft. weights 100 lbs.)		Ton miles—34,020		Ton miles—77,760		Ton miles—56,700		Ton miles—129,000	
Cost per cu. yd.—\$.474—\$.41 cts.		Cost per cu. yd.—.4261—42 cts.		Cost per cu. yd.—.1723—17 cts.		Cost per cu. yd.—.2518—25 cts.		Cost per cu. yd.—.1041—10 cts.	
Cost per ton mile—.3027—30 1/2 cts.		Cost per ton mile—.1978—19 1/2 cts.		Cost per ton mile—.0638—6 1/2 cts.		Cost per ton mile—.092—9 cts.		Cost per ton mile—.059—6 cts.	

TABLE B

—Local Coal Delivery, outlying districts supplied by truck or tractor

A—HORSES		B—5 TON TRUCK		C—6 TON TRACTOR		D—6 TON TRACTOR WITH EXTRA BODY		E—10 TON TRACTOR	
Average load—7,000 lbs.		Average load—5 tons		Average load—8 tons		Average load—6 tons		Average load—10 tons	
Average trips per day, 4		Average trips per day, 4		Average trips per day, 4		Average trips per day, 8		Average trips per day, 3	
Average mileage per day, 15		Average mileage per day, 30		Average mileage per day, 30		Average mileage, (estimated), 48		Average mileage, 26	
Average tons per day, 14		Average haul—3½ miles		Average haul—3½ miles		Average haul—4 miles		Average haul—4 miles	
Investment —		Investment — \$3,500.		Investment —		Investment —		Investment —	
Wagon	\$100.			Tractor	\$3,500.	Tractor	\$3,750.	Tractor	
2 horses	\$600.			Wagon	650.	Wagon	850.	Wagon	
Total	\$1,600.			Total	\$3,900.	Total	\$4,350.	Total	\$4,600.
Assumed haul 1½ miles									
CHARGES (per year)		CHARGES (per year)		CHARGES (per year)		CHARGES (per year)		CHARGES (per year)	
Interest	\$ 78.	Interest	\$ 250.	Interest	\$ 178.	Interest	\$ 200.	Interest	\$ 210.
Insurance	55.	Insurance	346.	Insurance	236.	Insurance	247.	Insurance	247.
Depreciation, horses	96.	Driver	1,092.	Driver	1,092.	Driver	1,092.	Driver	1,092.
Driver and helper	1,360.	Helper	680.	Helper	680.	3 Helpers	1,500.	2 Helpers	1,200.
Stable	520.	Garage	380.	Garage	380.	Garage	380.	Garage	380.
Total fixed charges	\$2,640.	Total fixed charges	\$2,600.	Total fixed charges	\$2,600.	Total fixed charges	\$3,650.	Total fixed charges	\$3,910.
Maintenance, horses	\$ 40.	Depreciation, tractor	\$ 450.	Depreciation, tractor	\$ 261.	Depreciation, tractor	\$ 592.	Depreciation, tractor	\$ 341.
Maintenance, wagon	45.	Gasoline	516.	Gasoline	117.	Gasoline	449.	Gasoline	334.
Depreciation, wagon	54.	Oil and Grease	103.	Depreciation, wagon	117.	Oil and Grease	205.	Oil and Grease	185.
Total operating charges	\$109.	Maintenance	315.	Gasoline	480.	Tires	693.	Tires	360.
Total	\$2,733.	Total	\$4,433.	Oil and Grease	98.	Maintenance, tractor	612.	Maintenance, tractor	202.
Tons per year—4,200		Tons per year—6,200		Tires	99.	Maintenance, wagon	384.	Maintenance, wagon	72.
Cost per ton—\$317—53½ cts.		Cost per ton—704—70½ cts.		Total operating charges	\$1,472.	Total	\$7,633.	Total operating charges	\$1,676.
Cost per ton mile—3838—30½ cts.		Cost per ton mile—1878—18½ cts.		Total	\$4,972.	Total	\$7,633.	Total	\$4,725.
Tons per year—12,600		Tons per year—12,600		Tons per year—9,000		Tons per year—9,000		Tons per year—9,000	
Cost per ton—\$259—43 cts.		Cost per ton—\$444—64 cts.		Cost per ton—\$259—43 cts.		Cost per ton—\$259—43 cts.		Cost per ton—\$259—43 cts.	
Cost per ton mile—1615—16½ cts.		Cost per ton mile—1723—17½ cts.		Cost per ton mile—1615—16½ cts.		Cost per ton mile—1615—15 cts.		Cost per ton mile—1615—15 cts.	

the rear tractor spring construction, this making feasible the employment of a 10 or 15 ton body. This body, being separated from the propelling mechanism, eliminates the necessity of adding to the cost of the latter and permits the use of steel tires under the load. This will explain the difference in some of the charges between the motor truck and the tractor.

The decided increase in the price of gasoline and the increasing tendency to insure against injury to persons and property by collision, as well as against fire, together with recent changes in cost of employer's liability insurance, has been taken account of in this paper.

The following are the items taken into consideration in figuring the charges and these are divided into fixed and operating.

## HORSE-DRAWN EQUIPMENT

### Fixed Charges

Interest at 5 per cent.

Insurance (Mass. rates outside of Boston), Employers' Liability, Fire and Liability.

Depreciation, Horses at 12 per cent., Harness at 10 per cent. Driver.

Feed and stable, Veterinary, etc., \$5.00 per week per horse.

### Operating Charges

Maintenance.

Shoeing at 1 ct. per mile per horse.

Wagons and Harness at 1 ct. per mile.

Depreciation, Wagon (Based on 50,000 miles total mileage.)

TABLE C

—Long Distance Trucking, Assumed Haul of 20 miles.

A—FOUR-HORSE WAGON		B—THREE TON TRUCK		C—FIVE TON TRUCK		D—TEN TON TRACTOR	
Average load—5 tons		Average load—3 tons		Average load—5 tons		Average load—10 tons	
3 Trips per week, 50 weeks per yr.		Investment — \$4,000.		Investment — \$5,500.		Investment, tractor	\$3,750.
Investment, horses wagon	\$1,600.					wagon	750.
Total	\$2,400.					Total	\$4,500.
CHARGES (per year)		CHARGES (per year)		CHARGES (per year)		CHARGES (per year)	
Interest	\$ 120.	Interest	\$ 179.	Interest	\$ 200.	Interest	\$ 205.
Insurance	54.	Insurance	228.	Insurance	242.	Insurance	231.
Depreciation, horses	192.	Driver	1,092.	Driver	1,092.	Driver	1,092.
Driver	960.	Helper	680.	Helper	680.	Helper	680.
Stable	1,800.	Garage	348.	Garage	380.	Garage	380.
Total fixed charges	\$2,306.	Total fixed charges	\$2,339.	Total fixed charges	\$2,694.	Total fixed charges	\$2,428.
Hotel	\$ 458.	Depreciation	\$ 429.	Depreciation	\$ 668.	Depreciation, tractor	\$ 420.
Maintenance, horses	240.	Gasoline	480.	Gasoline	680.	" wagon	180.
" wagon	68.	Oil and Grease	96.	Oil and Grease	137.	Gasoline	975.
Depreciation, wagon	96.	Tires	618.	Tires	750.	Oil and Grease	175.
Total operating charges	\$ 846.	Maintenance	360.	Maintenance	420.	Tires	600.
Total	\$3,182.	Total operating charges	\$2,993.	Total operating charges	\$2,993.	Maintenance, tractor	430.
Ton miles—15,000		Ton miles—18,000.		Total	\$5,077.	" wagon	130.
Cost per ton miles—210—31 cts.		Cost per ton miles—341—34 cts.		Total operating charges	\$2,779.	Total	\$5,192.
Ton miles—15,000		Ton miles—18,000.					
Cost per ton miles—210—31 cts.		Cost per ton miles—341—34 cts.					
Ton miles—15,000		Ton miles—18,000.					
Cost per ton miles—210—31 cts.		Cost per ton miles—341—34 cts.					

## MOTOR TRUCK AND TRACTOR

## Fixed Charges

Interest at 5 per cent., (on truck value minus tires).

Insurance (Mass. rates outside of Boston).

Employer's Liability, Fire and Liability to Persons and Property.

Driver at \$3.50 per day.

Garage Charges.

## Operating Charges

Depreciation, (Based on 100,000 miles total mileage and on truck value minus tires.)

Gasoline at 20 cts. per gallon.

3 ton truck —5 miles per gal.

5 ton truck —3½ miles per gal.

6 ton truck —3 miles per gal.

6 ton tractor—4 miles per gal.

10 ton tractor—2¾ miles per gal.

Oil and Grease.

20 per cent. of gasoline.

Tires, (Based on 8,000 miles guarantee. Price according to size of truck.)

Maintenance.

3 ton truck —3 cts. per mile.

5 ton truck —3½ cts. per mile.

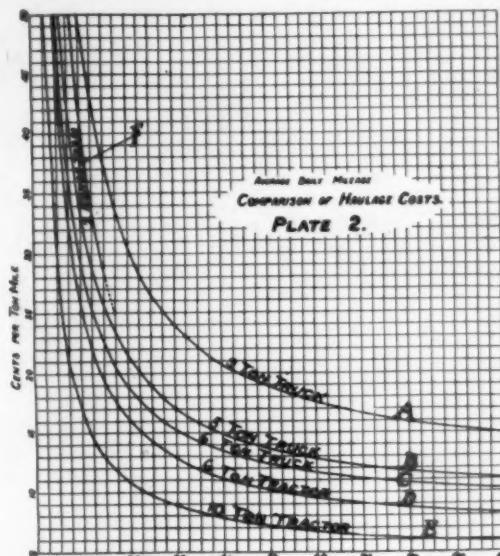
6 ton truck —4 cts. per mile.

6 ton tractor—3 cts. per mile.

10 ton tractor—3½ cts. per mile.

The three examples in tables A, B and C, show the probable cost per ton mile of doing these three different classes of work with horses, motor truck or Knox-Martin tractor. It will be seen that the operating charges are assumed to vary directly with the mileage and would be the same rate per mile for the same truck or tractor, without regard to the kind of work. If, then, we took an average of the fixed charges over the different kinds of work, thus averaging such variables as cost of helpers and insurance, we could get an average daily fixed charge for each hauling unit, and this would be independent of the mileage. These average fixed charges and the operating charges are shown in Table D and the results plotted in the form of curves in Plate 1.

If we assume the average load to be the rated capacity of the truck and that it is loaded one half the distance travelled we can, from these charges, determine a cost per ton mile of hauling, which will vary with the miles travelled per day. This cost per ton mile is shown in Plate 2.

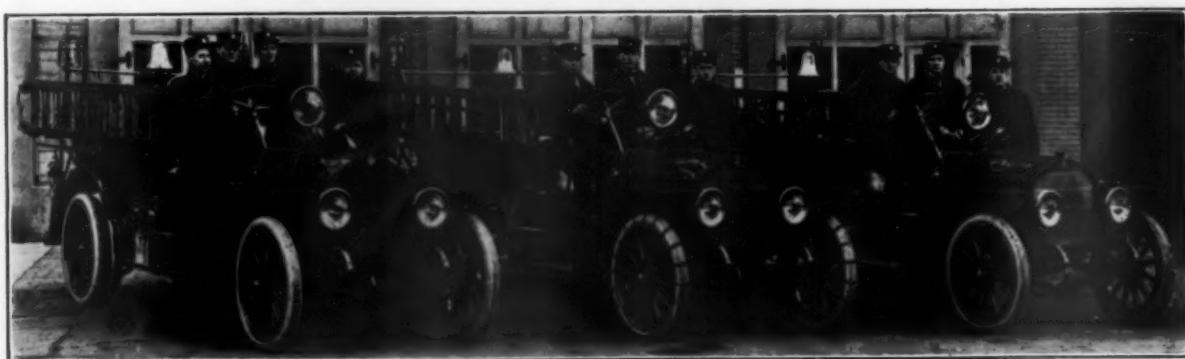


The foregoing costs are based on 300 working days per year. If in any business the work is unsteady, so that there is considerable idle time, the cost per ton mile will increase very materially, since such charges as interest, insurance, wages, garage, part of depreciation charge, etc., will not stop during the time the truck or tractor is idle.

In contracting work the costs found would be realized only on large scale operations, with the installation of special loading chutes and dumping bodies.

In the case of long distance hauling, when we reach a point where the length of haul is too great for horses to make a daily trip the heavy motor truck shows an advantage and the tractor a decided advantage, the showing of the tractor being due to its greater capacity with a smaller investment.

The class of work for which the light delivery truck is especially adapted has not been dealt with in this report.



Dayton's Apico Electric Equipped Fire Motor Trucks

The above illustration shows three fire trucks recently purchased by the Dayton, Ohio, Safety Department. These trucks are completely equipped with the Apico Electric Lighting System, Apico Golden Glow Headlight and Searchlight, manufactured by the Apico Electric Company, Dayton, Ohio.



## British Heavy Motor Trucks

### A General Summing Up of British Practice: The Fuel Situation; Clutches; Change Gears; The Thomas Transmission; Live Axle vs. Chain; Front-Wheel Brakes, and Drive



BOUT the middle of March this important paper was read before the Institution of Automobile Engineers by George W. Watson and D. S. Kennedy, two members of that Institution. The following are extracts from the paper:

The experience of the authors pointed to a 4-cylinder engine with a 4½-in. cylinder diameter, and 5-in. stroke as giving the best all round results with the 3-tonner, while for a 4-5-ton vehicle they advocated 4¾ in. diameter, and 5 in. stroke, but with the latter size, a compression release arrangement was recommended. And with these sizes assuming a normal engine speed of 1000 r. p. m. when traveling on the top gear of 12 miles an hour, a moderate compression of 75 lbs. to the sq. in. was advocated.

#### Details of Engine Design

Great importance too was attached to accessibility, especially through crank case inspection doors, and in this connection, special mention was made of the Maudslay engine.

#### Fuel

"The present time," said the authors, "when petrol prices are soaring higher each week, is a not inappropriate one for makers and users to consider whether they are altogether at the mercy of the petrol combine. Recent investigations would indicate that they are not. The use of benzol will undoubtedly be a feature of future development.

"The adulteration of petroleum spirit has gone along slowly but surely, and the grade has gradually become heavier, until what is to-day sold as petrol contains nearly one-half of the heavier fuels, such as paraffin, (kerosene), yet there appears to be no difficulty in the way of producing carburetors capable of dealing with this heavier fuel. So far have engineers gone in this respect, that it is not too much to expect that in the near future, they will go the whole way, and use paraffin only.

"The change of state from paraffin to a gas, calls for a different amount of air than does petrol (gasoline); hence, all air adjustments must be different. The change also calls for additional heat from some source, particularly at starting, because the heavier fuel will not vaporize so readily."

There are two ways of using the heavier fuels.

(1) Atomization without any physical change, as by spraying the fuel into the combustion chamber. (2) By changing its physical state to that of a fixed gas. The for-

mer is much the simpler, but does not give reliable results. The second, though involving more complication, is more correct, and generally recognized as the best method. This entails complete vaporization of the fuel in the presence of as small amount of air as possible to prevent cracking. The resultant gas must be mixed with the full amount of air at a point as close to the cylinders as possible, and condensation be obviated at all costs to avoid carbon deposit and consequent preignition in the cylinders.

#### Clutches

Clutches were divided into three classes—the cone, multiple disc and De Dion types. Cone clutches were divided into metal to metal, metal to leather, and cork insert type, and the latter recommended as most efficacious in preventing the imposition of sudden excessive shocks on the transmission. The multiple disc type operating in oil-tight casing is compact and light, but it was pointed out that while the oil film often prevents harsh engagement, it may also act as a binder, and the drag between the plates, even with pressure released, may be enough to make coasting well nigh impossible without risk of the clutch seizing.

#### Change Gears

Short shafts, improved ball and roller bearings, steels that will permit rough use without early fracture, and improved methods of gear cutting and grinding were quoted as having contributed to the production of the successful gear box. The authors were not convinced that the chain-driven type has appreciable advantages, while its cost is undoubtedly greater than that of the ordinary spur gear box, but the success of the chain driven gear box on the London omnibuses in giving quiet running was, in our contributor's opinion, passed over without the attention it deserved.

Most of the excellent electric systems giving great flexibility were dismissed as showing too low an efficiency, because the entire load is at times transmitted electrically and the total efficiency of the dynamo and final transmission has been known to fall below 50 per cent.

#### The Thomas Transmission

Special attention, however, was given to the Thomas transmission which consists of an engine, a simple epicyclic gear, two electrical machines available either as dynamos or motors, and two clutches. A 12-volt battery is carried, and

when current is circulated through the windings, the first electrical machine starts up the engine through the forward clutch, the second clutch being disengaged. If then the forward clutch is disengaged the rear clutch put in, the planetary cage is rotated at crank shaft speed; and as the small sun pinion is coupled to the armature of the front electrical machine, and the larger pinion to the second machine, relative motion occurs between the various pinions. Now the second electrical machine is permanently coupled to the driving axle, and on account of the load on the road wheels will tend to remain stationary at first; consequently, the smaller of the sun pinions and the first electrical machine will tend to rotate in a direction opposite to that of the engine. The first machine then acts as a dynamo supplying current to the second, and driving it as a motor. In this way, the epicyclic gear, having a differential effect, drives the armature of the second machine partly mechanically and partly electrically. As the control lever is advanced the strength of the field of the first dynamo is varied and its speed of anti-englnewise rotation gradually reduces until it first comes to rest, and then rotates in the same direction as the engine. As the vehicle speed increases, gradually the difference in rotation speed between the two armatures is reduced, until both are rotating at the same speed, when the forward clutch is engaged, and the engine is in direct connection with the final drive, all the electric machinery being inoperative.

Indications generally point to the live axle ousting side chain drive, but the authors questioned whether the live axle was best suited for heavy vehicles in rough countries. The chain driven vehicle allows of a lower loading platform than the live axle.

The silencing effect of worm final drive was mentioned as an advantage of the type, but the authors refrained from expressing opinions as to relative efficiencies of the types.

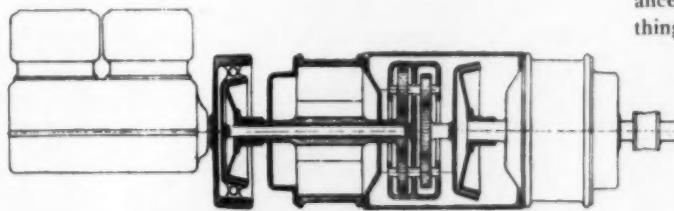


Diagram Explaining Principle of the Thomas Electro-Mechanical Transmission

To obtain sufficient speed reduction between engine and road axle, reduction gears are sometimes introduced into the back axle, and on this design the authors comment that "if mechanical losses in the gears were taken into account, this type of axle would be slightly less efficient."

#### Torque and Radius Rods

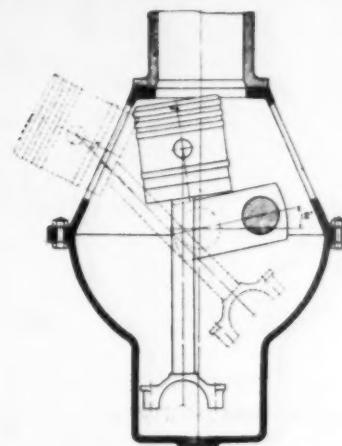
Discussing tubular propeller shaft casings, the opinion was expressed that the use of a combined torque and thrust member was perfectly justifiable on good roads, but in rough country side radius and torque members were preferable.

Front brakes in the opinion of the authors are a source of danger; many accidents to motor fire engines have resulted from their use.

Stress, too, was laid on the necessity for adjustment for wear, and provision for taking thrust in steering gear. Many designs leave much to be desired in this respect. Apropos of the gear itself, preference was expressed for the screw and nut type, rather than the worm and sector.

#### Front Drive

The authors admitted lack of personal experience with front wheel-driven vehicles so much in favor in France, but both of them expressed admiration for the ease with which this type of vehicle could get out of difficult positions on greasy pavements, and its absence of side-slipping tendency. It is doubtful, however, whether the front drive principle will



Section Showing How Piston May Be Withdrawn Through Crank Case Inspection Covers on the Maudslay Engine.

ever be adopted, except for special purposes involving a very low platform position (e. g. vehicles for carrying furniture, safes or injured horses).

To sum up, enclosure of every working part from dust and grit was advocated, with a flexible transmission and an avoidance of any attempt to secure rigid frame construction. Everything should be so mounted that distortion due to uneven road surfaces and bad loading would bring about no undue strain.

Italy has decided on the expenditure of \$2,000,000 on automobiles for her army—this as a result of the very effective work that was done by the numerous motor trucks used by the Italian army in Tripoli.

#### The Tire Question

The importance of rubber tires, especially for night work when running in towns (e. g. in municipal work), was accentuated, and it was stated that the extra mileage possible with them more than made up for the extra cost, and this, to some extent because they decreased the machinery repair bill. The table of tire costs per vehicle mile given by the authors, is as follows: 3-ton gasoline wagon, 3 cents; 3-ton steam wagon, 3.5 cents; 5-ton gasoline wagon, 5 cents; 5-ton steam wagon, 5.5 cents.

The tire sections given by manufacturers, were considered satisfactory provided overloading of the car is avoided.

Finally, the authors laid great stress on alignment, pointing out that if, as frequently happened a pair of 32 in. wheels were 1 in. out of alignment, the sideslip due to this amounted approximately to 3 per cent. traveled by the car, that is to say, for every 100 miles traveled by one wheel, the other would tend to travel 3 miles less. Even apart from the sideslipping, lack of alignment causes enormous wear of the tires.

## Kerosene and Heavy-Oil Fuel Devices

BY OUR FOREIGN CORRESPONDENT

(Continued from March issue)

Running conditions involve slightly different general arrangements, the Simplex arrangement shown at I, in fig. 4, being preferable for hot countries, while either II. or III. may be adopted in cold climates. Though the arrangement is exceedingly simple, it certainly seems effective, and its work has attracted much attention.

### The Stewart-Morris Kerosene Carburetor

Another kerosene and heavy oil appliance is the Stewart-Morris carburetor, which has recently attracted attention on account of a successful test held under the direction of the Royal Automobile Club. The device was fitted to a 27.3 h. p. Pathfinder car, of American build, the total average weight being 3826 lbs. The following figures give the consumptions at varying speeds.

Speed m. p. h.	Consumption miles per gallon.	Ton-Mile per gallon.
10.6	23.12	39.48
14.9	23.81	40.66
20.1	26.69	45.58
25.2	27.19	46.44
30.45	23.94	40.89
35.8	17.45	29.81

The engine was started direct on kerosene 23 times, on one occasion after it had been standing 17 minutes. On 4 occasions unsuccessful attempts were made to start on kerosene direct, and in 9 cases the engine was started on kerosene after petrol had previously been injected into the induction pipes,

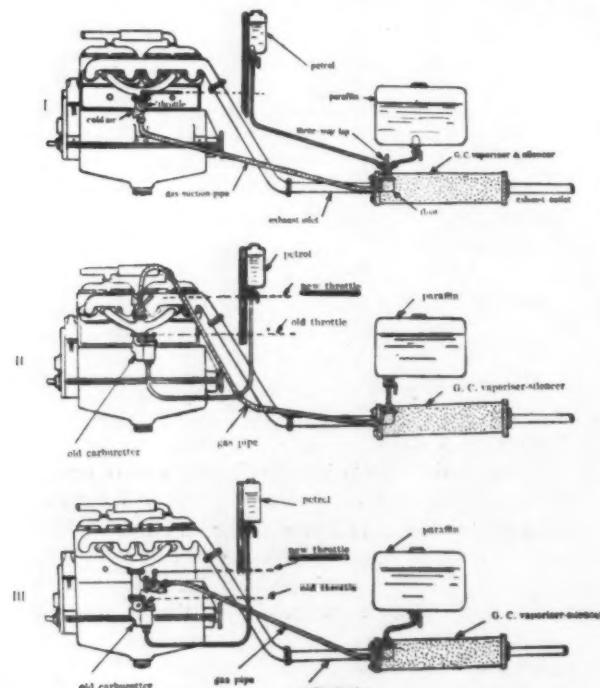


Fig. 4. Indicating Various General Arrangements of Fuel Supply for the G. C. Vaporizer

the longest stop after this was done being 45 minutes. The total distance covered was over 2,003 miles, half on the road, half on the Brooklands track, and the average running time was 19.8 miles an hour. At the conclusion of the trials the cylinders were removed, and a considerable amount of deposit was reported on the piston heads of numbers 1 and 4 cylinders, not so much on cylinders 2 and 3. In all cases the cylinder heads and valve ports had slightly sooty deposits. Valves and sparking plugs were also reported as slightly sooty, in explanation of which it was stated that the engine showed signs of over-lubrication. Throughout the trial no misfiring occurred, except during the last 200 yards of a slow-running

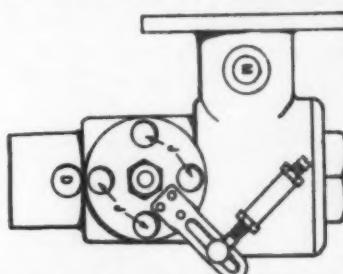


Fig. 5. Sectional Diagram to Explain the Stewart-Morris Paraffin Carburetor

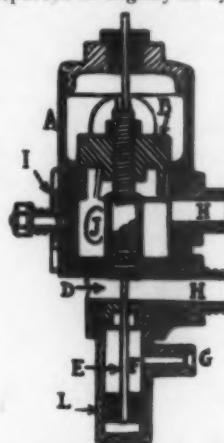


Fig. 6. Adjustable Connection

test, in which the car was kept down to 6.14 miles an hour on top gear. The temperature of the cooling water was found to range between 94 and 96 Deg. C. In the main the test may be regarded as satisfactory.

### Details of Stewart-Morris Carburetor

The Stewart-Morris carburetor may best be explained by reference to the sectional diagram, Fig. 5. The main body A. is cast with a central socket in the bottom of the chamber. In this slides a spindle C. screwed at the top to check the weighted valve B., the movement of which is regulated by the suction of the engine. This valve on lifting allows the mixture to pass through orifices tapered to adjust the flow of gas to requirements. At the lower end of the spindle C. a tapered jet needle E. is swung from a gudgeon pin arrangement, and this passing through a hole in the cap of the chamber F. is fitted at its lower end with a damper piston L., which is a loose fit in its cylinder. From the inlet G. kerosene is fed at slight pressure, so that it rises through whatever aperture is permitted by the position of the tapered needle, and in the passage H. mingles with whatever air is flowing in through D. This mixture then passes out from H. into an exhaust-heated vaporizer, hence it is drawn by engine suction into the chamber H. I., and from here it passes to the engine by the valve, as already explained. The air valve disc I. uncovers further air orifices J., and the lever operating this is connected to the throttle lever by a nicely adjustable connection, A., Fig. 6, so that throttle and air valve operate in a predetermined proportionate manner.

## London Omnibus Working Cost— Some Figures

The accounts of the London General Motor "Bus Company, Ltd., for the half-year period, from June 21st to December 31 of 1912, are very instructive. For this period, the gross earnings of the company amounted approximately to \$7,900,000, of which no less than 92 per cent. were swallowed up in working expenses, leaving only \$632,000 as net revenue. When the old company was liquidated at the beginning of this period, motor omnibuses taken over numbered 1950, while at the end of the year their number was given at 2250, giving an average of 2100 'buses over the half-yearly period. On this basis, the gross receipts worked out approximately to \$770 per omnibus. Of this, the general expenses given in the aggregate at approximately \$4,017,000, accounts for \$1913 per 'bus, or a little more than 50 per cent. as compared with 43 per cent. for the 12 months up to September 30, 1911. Maintenance charges are placed at \$2,817,480, or about \$1340 per vehicle. For the 12 months up to September 30, 1911, this item came to \$1565, so here on the other hand, there is a considerable saving.

Although in Europe the electric commercial car has not made headway as in America, owing to the comparatively high cost of current and the infrequency of charging stations (for only in towns of considerable size is current available), still electrics have untried possibilities in some of our great cities if only the charges for battery maintenance can be kept down.

These conditions are evidently appreciated, for during the last month an Edison storage battery van of 1000 lbs. carrying capacity has undergone a 3123 mile trial at the hands of the Royal Automobile Club, with favorable results.

## BRITISH ARMY COMMERCIAL CAR TRIALS

The British Army authorities are passing types of motor vehicles as suitable for their work, on the instalment system, so to speak, by a number of comparatively small trials at somewhat frequent intervals. For these trials two different sizes of car are specified, namely 1½ and three-ton. In the first trials held last summer Leyland machines qualified in both classes, and in the trials recently concluded, certificates under the subsidy scheme were awarded to J. & E. Hall, Ltd., and J. I. Thornycroft & Company, Ltd., for three-ton vehicles in each case. The trial consisted of about 1500 miles of running, spread over 22 days, and over all sorts of roads, including some severely hilly country, at the average speed of 11.3 miles an hour. The fuel consumption averaged 43.7 gross ton-miles per gallon of gasoline, which as the Army authorities themselves point out, is at least equivalent to the specified standard of 50 gross ton-miles per gallon under normal conditions, when the frequently heavy state of the road in these trials are taken in consideration. The next set of trials will probably take place in the first and second weeks of September next.

*To be successful, study the successes,---not copy  
the excesses,---of others*

### PEERLESS VINEGAR-TANK TRUCK

The Peerless five-ton truck of Alarth & McGuire, of New York, looks just like a water wagon, but in reality transports one of the essentials of the pickling process, vinegar. The truck is used to carry the vinegar from the railroad yards to the works.

A quick loading arrangement in the shape of a centrifugal pump has been attached to the truck by the firm's engineer. The truck is run along side a tank car and the right rear wheel jacked. The mechanism of the pump is attached to this wheel by a belt. The hose is sunk in the tank car and the motor started. It turns the rear wheel over rapidly through the differential, and 1153 gallons of vinegar, the capacity of the truck's tank, is pumped in twelve minutes.

The wheel is lowered and away goes the load. It takes about twenty minutes to accomplish the whole operation. At the receiving end the vinegar is run through a hose from the pipe in the bottom of the truck to another which extends from the sidewalk in front of the plant.

The truck averages forty-five miles a day and carries five loads of vinegar. The record haul for one week since the truck was first put into service was 26,000 gallons. A float at the front end of the tank shows how high the level of vinegar inside is at any time.

### STOPPED RUNAWAY WITH ELECTRIC TRUCK

Joseph A. Bianco, driver of the New England Telephone & Telegraph Company's truck, Boston, Mass., saw a runaway approaching a crowd of elderly people who were crossing the street. Realizing that the horse would be upon them before they could scatter, he drove his electric truck across the head of the runaway, jumped from the seat and grabbed the horse's head, throwing him to the ground at the risk of his own life, as the pavement at the time was covered with slush and snow. He was presented with a medal by the Humane Society of Mass., February 16, 1913.



The Peerless Vinegar-Tank Truck

This Truck is fitted with a tank for carrying vinegar, and has a capacity of 1153 gallons. At the rear is mounted a centrifugal pump, which is used to pump the liquid from the tank cars into the truck's tank, the operation requiring twelve minutes.

## PITTSBURGH MOTORIZING ITS FIRE DEPARTMENT

"Motor propelled fire apparatus," said John H. Dailey, director of the Department of Public Safety of Pittsburgh, "has come to stay. If it had nothing but its economical cost of operation to recommend it, motorized fire apparatus would be a mighty big paying investment for any place, but this, in reality, is but one of its minor favorable features. The really big thing in its favor is its efficiency and its ability to respond promptly to an alarm of fire. According to figures compiled in some places where motorization is fairly under way, in only 1½ per cent. of the alarms has it been found necessary to use a water line.

The actual figures compiled from the operation of what motor apparatus we have, show that when we have our department completely motorized, we will save in the first year almost double what the entire motorization cost us. It costs approximately \$600 per year, per piece, to maintain the horse drawn apparatus. On motor propelled fire apparatus the cost of maintenance is approximately \$55 per year, per piece. This figure is taken from the cost of operation of our combination chemical and hose wagon at No. 26 engine house.

"We operate a total of 131 pieces in our fire department and keep constantly on hand 25 extra horses, which is the equivalent of, say, 12 pieces more, making a total of 143 pieces. This does not include the runabouts and horses of the chief engineer and district chiefs. This makes a comparison as follows:

"143 pieces of horedrawn apparatus at \$600 per an-	
num .....	\$85,600
143 pieces of motor propelled apparatus at \$55 per an-	
num .....	7,865
Balance in favor of motor apparatus, per annum .....	\$77,935
Add loss through death of horses, etc., about .....	7,000
Total .....	\$84,935

"A very large item of economy that must be added to this is that brought about through the reduction of men in the service. This reduction, it should be understood, will not be brought about through the discharge of any of those now in the service. The fire department loses every year through various causes such as illness, death, voluntary resignation, because of engaging in some other business and retirement on pension, forty to fifty men. It will take about three years to completely motorize our department, which means we will lose in that time from 120 to 150 men now members of the department. When the department is completely motorized, with the same number of pieces of apparatus now used, we will need 116 men less, as there are that many who do nothing now but take care of their horses. With motor propelled apparatus any one of several men of the crew of each piece will be able to drive their car, this condition now being the rule. This reduction in the force will mean an additional saving to the city of approximately \$143,000, and this added to the saving in the cost of maintenance makes a total of \$227,735.

"When the entire department is motorized we will be able to dispense with about twelve engine houses now in operation without decreasing the efficiency of the department; in fact, it will, if anything, increase the efficiency because of the superiority of motor over horedrawn apparatus."



**Dead-Horse Truck**

The above truck is made by the Universal Truck Company, of Detroit, and was built for the Millenbach Brothers Company, for removing dead horses. The truck is equipped with a powerful windlass, operated from the engine, through the transmission and jack shaft, so that even the largest horse can be loaded in less than five minutes. One man can operate the entire outfit, as the windlass is controlled from the driver's seat.

## THE COST OF DELIVERY

The Golden Rule Department Store of St. Paul, Minn., which is using four 1500 lb. motor wagons in its delivery service, has issued a statement which shows that one of its autos is delivering at a cost per package of less than 3½ cents.

According to the statement the total cost for one year of the motor car in question was as follows:

Gasoline, \$283.44; lubricating oil, \$49.20; tank recharges, \$12; speedometer, chains, other articles and incidentals lost or broken, \$33.90; tires \$374.48; tire and tube repairs, \$91.65; driver's salary, \$700; helper's salary, \$260; total, \$1,804.67.

The number of packages delivered was 86,432, and an average of 49.5 miles was covered each day. When the truck started on this route it was delivering 5428 packages a month. Every month has shown an increase until 9109 packages were delivered in December, using the same amount of help and covering a slightly smaller area of territory than at first.

The average daily delivery from one Golden Rule car is 282.5 packages per day. The cost per package, including upkeep, depreciation, interest, insurance and everything, is less than 3½ cents.



**A. T. and T. Company Uses GMC Trucks**

The American Telephone and Telegraph Company has in the service of its subsidiary companies ten 1½ and two-ton GMC trucks, similar to the one shown above. They are employed chiefly in maintenance service where quick and reliable work is the first essential. The last order received from this company was for three trucks to be used over the rough mountain roads of Tennessee.

## Trucks Assist in Great Work of Road Building and Street Cleaning

(Continued from page 22)

With horses on trips of 10 miles in length the cost is about 1 cent a gallon, or \$10 for a two-horse team. With a five-ton truck, costing \$15 per day to operate, or even less, for a six-ton truck can be operated for this figure, two trips can be made carrying double the quantity, thus showing a saving of \$5 per day. Above the ten mile limit the saving by the commer-

trucks are loaded from a tank car by suction, as some of these machines are fitted with a Kinney rotary pump, especially those used for spreading the lighter products. This pump is operated from the engine, the pump being used either for drawing a supply into the truck, or for discharging it onto the road. Sometimes a fleet of horse trucks accompany the tank when working within short range, and the truck draws its supply from the



Group of "Tarvia" Trucks in Operation

Upper right, loading; upper left of center, spreading by hand; two lower views, spreading by sprinkler

cial cars increases rapidly with the distance. For instance, on a 15-mile haul, it would cost about  $1\frac{1}{2}$  cents per mile by horses, or \$15, while with the truck two trips could be made at approximately 1 cent per gallon as before, making a total cost of but \$15 to do the same work as would cost \$30 by horses, making a saving in favor of the truck of \$15 per day.

Above this distance there is no comparison whatever. This is particularly true as the company charges slightly higher prices when the trucks are sent long distances, than when the Tarvia is simply shipped in barrels. In the latter case, the material has to be heated in kettles alongside the road, and the spreading done by poring pots from these local tanks. This requires more men and takes a longer time, so the Barrett Manufacturing Company reports that it is having calls for the truck service to points over 60 miles from the loading station, and people are willing to pay an increased rate for this service, claiming that it reduces the final cost.

Depreciation is figured at the present time at 25 per cent., although Mr. Sharples acknowledged that he did not know whether this figure was correct or not.

The material keeps warm for six hours or more, so that at the rate of 9 miles per hour, the trucks can go without re-heating, in the neighborhood of 40 to 45 miles from the loading station at Everett. Thus they are enabled to reach Worcester, Plymouth and Taunton. In case of delays they can always be connected to steam rollers and warmed up. Occasionally the

horse trucks, 20 minutes being required to load it and 40 minutes to discharge it through the spraying apparatus.

In 1912 the company had three trucks in this service in Boston, and one three-ton truck in general delivery work. They have now added three  $6\frac{1}{2}$ -ton trucks, with spreading machines, making seven in all.

### Trucks Used for Ordinary Hauling in Winter

Thirty bolts hold the tanks in place. These can be removed, and ordinary express or top bodies put upon the machines, and this is done during the winter time, and the trucks used for ordinary hauling, as road repairing is essentially summer work, the season for the road work opening April 15th and closing December 1st. Horses are used for general hauling by the company, but in the winter, the trucks being relieved from Tarvia duty, are put into service, and the horses allowed a partial rest, as it is found that the trucks are more efficient than horses during the winter season.

The trucks are purchased with the understanding that they were to be kept in shape by the Alco Service Department, for use in the day time, and repairs done at night if necessary. This presented a somewhat new problem for the service department, as it was impossible for them to supply a new tank truck to do the work and repair the old one at leisure, as with the ordinary truck. Therefore, they had to be repaired at once during the night, and put in shape for the work of the next

morning. If trouble occurred at a distance of 45 miles from Boston, this meant considerable travel for the emergency crew, but the service rendered has been very satisfactory, in spite of these difficulties.

Drivers immediately report by telephone any troubles, and wait for instructions from the office as to what they shall do. The tire companies also replace the tires during the night if necessary.

The fleet of trucks ran on a regular schedule during last summer, not missing a single trip.

Owing to the weight of the trucks there have been occasional delays owing to breaking through new ditches, etc. The large truck chassis weighs  $4\frac{1}{2}$  tons, carries a load of  $6\frac{1}{2}$  tons, and carries apparatus weighing about 1 ton, making in all a total of 12 tons. To get this out of a soft ditch the services of the nearest steam roller is usually required, and is usually forthcoming when desired. Tire troubles have caused about all delays that have been encountered. A regular inspection is given the trucks once each month, and repairs made. If necessary, parts are replaced at once, but repairs are usually made on rainy days when the trucks cannot work on the roads, as the spreading of Tarvia must be done on a dry surface.

#### Municipalities Using Motor-Driven Vehicles in Street Maintenance

Not only by contractors and on country roads are commercial cars being employed, but in cities as well their efficiency for collecting garbage, cleaning the streets and sprinkling them, is being recognized and more and more are employed each day for such work.

The cities of Denver, Colo., and St. Louis, Mo., are both using Saurer trucks for flushing the streets. By this we do not mean sprinkling, but forcing heavy streams of water under pressure across the surface of the pavement, flushing all street refuse into the sewers. These trucks are fitted with tanks carrying about 1,400 gals. of water, the flushing pipes being so arranged that streets up to 60 ft. in width can be thoroughly cleaned. The regular  $6\frac{1}{2}$  ton chassis is used. It is interesting to note that these trucks, according to the city records, easily flush from 45 to 55 miles of street per day, and each replaces 8 horse-drawn vehicles, thus these two trucks alone have taken the place of 16 wagons and 32 horses, not counting the animals which were kept in reserve. A like saving, and a very noticeable one, is that on labor, as the work of 16 to 18 men is now being accomplished by 4.



Fig. 9. Saurer Street Sprinkler in Action  
The water is forced under pressure across the surface of the pavement. One of these machines replaces eight horse-drawn wagons.

The trucks are also used for sprinkling, and the report is made that in the neighborhood of \$26 per day is being saved by the machine in Denver, which covers 47.3 miles in an 8-hour day. It is further stated that the streets are kept much cleaner and in a more sanitary condition.

#### The Sprinkler

As shown in a detailed view, the tank is mounted on 5 cradles securely bolted to the chassis frame, raising it about a foot above the frame. Although securely held, it is free to move, so that no strains are put upon it. The tank is 54 in. in diameter by 141 in. long, and the total weight of the out-

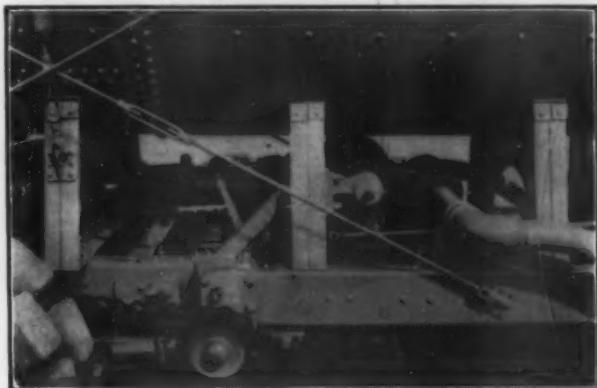


Fig. 10. Detail View of the Sprinkler  
Showing the Gould rotary pump, directly under the tank. The pump is controlled from the driver's seat

fit ready for operation and without water is 11,800 lbs. The water for the tank weighs 11,600 lbs., giving a loaded weight of 23,400 lbs. Filling is done through a hose connection, and an automatic check valve at the back, hydrant pressure opening it, and the tank pressure closing it after filling. The spraying nozzles are located at the front end of the car on either side of the hood, as shown in the front view. The water is pumped from the tank, and forced through the nozzles by a Gould rotary pump, located under the tank, as shown. This pump is chain driven through the jackshaft differential housing, therefore the quantity of water varies with the speed of the car.

#### Pump Control

A small lever at the right of the driver's seat operates the jaw-clutch to throw the pump in or out. In the center in front of the driver is located a lever which controls the nozzles. A by-pass valve is provided so that the water goes back into the tank when the pump is running and either of the nozzles is closed. The nozzles are readily adjustable for various street widths, and are removable for cleaning. A nozzle pressure of from 10 to 15 lbs. usually exists with ordinary speeds and delivery. The by-pass valve is set for 25 to 30 lbs.

#### Trucks Hauling Asphalt for Paving

The City of Pittsburgh has three  $6\frac{1}{2}$ -ton Alcos, equipped with all-steel bodies, in service at the city asphalt plant. The plant is equipped with two asphalt mixers, each mixing 1725 lbs. of asphalt at one time.

The trucks drive under the mixer which loads them. It takes eight dumpings from these mixers to fill each truck, requiring 16

minutes for loading, as shown in the page illustration. Each load usually weighs 13,860 lbs. or enough asphalt for 70 sq. yds. of pavement.

Use is made of the exhaust from the engine so that the load of asphalt is kept hot until it arrives at its destination.

The load is deposited in ten minutes by raising the sides of the body. Each side is divided in two sections, making four compartments, all told. The doors are raised by means of a handle on the ends of each side. There is also a chute for dumping the load away from the wheels. The power dump is a great saving of time, as the load is distributed, saving the labor of shoveling the asphalt.

#### Trucks Used for Oiling the Roads

The M. C. Whitmore Road Improvement Company, of Dayton, O., has discarded the horse in favor of a 2-ton Avery truck for road oiling. This truck is shown in the page illustration. It is used daily from 6.30 in the morning until 6.30 in the evening. Attached to the rear is a double action pump, chain driven from a sprocket on the rear wheel. The tank is filled by jacking the rear wheel, and driving the pump by

means of the engine of the truck. The oil is drawn by the pump from underground tanks over a heater which raises the temperature to about 200 degrees as it is forced into the tank of the truck. 800 gals., the capacity of the tank, are thus pumped into it in about 15 minutes.

The jack is removed and the truck travels rapidly to its destination, as far as 12 to 15 miles; the pump is then engaged with the truck still moving, but this time it is forcing air into the top of the tank, thus forcing the oil out through the distributing system, which spreads it evenly in small streams over the roadbed. The temperature at delivery is about 140 to 160 degrees.

With horses it was difficult to get to the scene of action before the oil cooled, and it was found necessary to force oil into the roadbed rather than sprinkle it, as is now found sufficient owing to its greater temperature.

This truck is doing the work of four teams and 6 men, in fact, is doing more than they formerly did, having made it unnecessary to work nights or Sundays, and the expense of operation is less.

### DART MANUFACTURING COMPANY'S NEW MODELS

The Dart Manufacturing Company, of Waterloo, Ia., is manufacturing three models known as E D, B and C. Owing to incorrect data being sent us from the factory, the specifications given in our March issue, page 35, were misleading. The details here given are asserted to be correct by President C. W. Hellen.

#### The Model E D

This model has a carrying capacity of 1500 lbs., chassis price is \$715, price express body, \$750; weight 1900 lbs., carrying space 45 x 78 in.; height of loading platform, 32 in.; maximum speed, 18 m. p. h.; motor 18.6 h. p., two cylinders, 4 1/4 x 5 in., cast singly, four-cycle, cooled by thermosyphon system; mounted on sub-frame, three-point suspended, located under body; honeycomb or tubular radiator, Schebler carburetor, force feed and splash systems of lubrication; ignition by Remy magneto and dry cells, one set of spark plugs, 1/2 in. pipe thread; disc clutch, chain drive, planetary transmission giving two speeds forward and one reverse with direct drive on second; expanding type rear wheel brakes lined with asbestos operated by foot and hand; solid tires 36 x 2 in. front and rear, mounted on Firestone rims; 16 in. steering wheel located on right side; springs full elliptic front and rear; wheelbase 86 in., frame pressed steel; 8 gal. gasoline tank under seat.

#### Model B

Model B is a 2000-lb. car, price of chassis being \$1100 and price with express body, \$1200. The weight is 2850 lbs.; carrying space 44 x 88 in.; height of loading platform 27 1/2 in.; maximum speed 15 m. p. h.; motor 29.6 h. p., four cylinders, 4 1-16 x 4 1/2 in., cast en bloc, water cooled by pump; mounted on main frame, four point suspended, located under hood; cellular radiator; Stromberg carburetor; Eisemann magneto, S. A. E. spark plugs; cone clutch faced with leather, selective transmission, three speeds forward; expanding and contracting type brakes lined with Raybestos; tires 36 x 2 1/2 in. front, 36 x 3 in. rear; S. A. E. rims; 18 in. steering wheel on left side; semi-elliptic springs front and rear; 114 in.

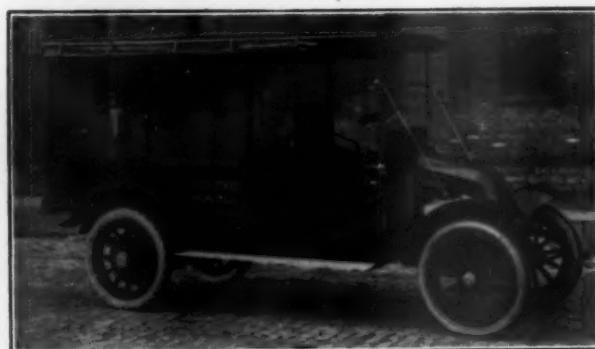
wheelbase; 18 gal. gasoline tank; other details same as Model E D.

#### Model C

Model C is a 3000-lb. car, price of chassis being \$1775. Weight of chassis is 3400 lbs.; carrying space 60 x 120 in.; height of loading platform 27 1/2 in.; motor 37.44 h. p., four cylinders 4 1/8 x 5 1/2 in., mounted on sub-frame; tires 34 x 3 1/2 in. front, 38 x 3 1/2 in. rear; wheelbase 130 in.; other chassis details same as Model B.

A KISSEL-KAR AMBULANCE, recently delivered by the Kisel Motor Car Company to St. Joseph's Hospital, Philadelphia, has many innovations in both construction and equipment. The interior is finished in natural mahogany. There are four dome lights, ice tank, oxygen tank, medicine cabinet, electric fans, sponge holder, wash basin, speaking tubes, and two rubber-wheeled stretchers on springs.

THE WESTON MOTT COMPANY, of Flint, Mich., has secured the services of John Swincoe, formerly chief engineer of the Driggs-Seabury Ordnance Corporation, Sharon, Pa.



**Stewart Truck, in Parcel-Post Service**

One of the ten Stewart Delivery Trucks recently purchased by the United States Post Office Department, for parcel-post service in Washington, D. C. These cars are equipped with a special wire-screen body, well adapted for package delivery.

## COMMERCIAL CAR AGENCIES WANTED BY:

**Note.**—In every case where capacity of machine or price is not given, the same have not been furnished us.

**Hoffman Wagon & Carriage Company**, 499 St. Paul Street, Rochester, N. Y., wants gasoline cars of various sizes and prices.

**DeMott & Garvin**, Grand Avenue, Englewood, N. J., want gasoline cars of light delivery type, to sell at various prices.

**Joseph D. Hoopes**, Manor & Lancaster Avenues, Downingtown, Pa., wants gasoline cars of 1500 lbs. to 3 tons capacity, to sell at \$750 up.

**Crescent Auto Company**, 8th & Louisiana Streets, Little Rock, Ark., want gasoline cars of 1000 to 2000 lbs. capacity, to sell at medium prices.

**Lawton's Garage**, Garrett County, Oakland, Md., wants gasoline cars of one and two-ton capacity, to sell at various prices.

**H. L. Arnold**, 1118-20 S. Olive Street, Los Angeles, Cal., wants gasoline cars of 1000 lbs. to 5 tons capacity, to sell at various prices.

**Charles S. Slining**, Delta Avenue & 7th Street, Gladstone, Mich., wants gasoline cars of one ton capacity, to sell at \$2000.

**C. R. Zacharias**, Eagle Hall, Asbury Park, N. J., wants gasoline cars of 500 to 3000 lbs. capacity to sell at \$750 up.

**J. D. Lewallin**, Mart, Tex., wants gasoline and electric cars.

**Atwood Lamp Repair Company**, Boston, Mass., wants light delivery wagons.

**Motor Car Repair Company**, West Union, O., wants gasoline cars of 1 and 2 tons capacity.

**Taylortown Auto & Machine Shop**, Taylortown, Minn., wants gasoline and electric cars.

**Mont Slemp**, care of Schmoyer Motor Company, Cushing, Okla., wants gasoline and electric cars.

**Newman's Garage**, Cor. 3rd & Centre Sts., Hobart, Ind., wants gasoline cars of 1 to 5 tons capacity.

**Kocourek & Breu**, Hopkins, Minn., want gasoline cars of 1000 to 3000 lbs. capacity, to sell at \$800 to \$1500.

**Greenfield's Auto Garage**, Lennox, S. Dak., wants gasoline cars of 500 to 2000 lbs. capacity, to sell at moderate prices.

**Dorley Garage & Repair Company**, Laurens St., Dublin, Ga., wants gasoline cars of 1000 lbs. to 3 tons capacity, to sell at \$800 to \$2000.

**C. H. Bent**, 11 Madison St., Glens Falls, N. Y., wants gasoline cars.

**C. L. Brown**, P. O. Box 36, Parkersburg, W. Va., wants gasoline cars of 1000 to 1500 lbs. capacity, to sell at \$1000 to \$1500.

**J. M. Brian, 3rd**, 341 S. Fremont St., Baltimore, Md., wants gasoline or kerosene cars of 1000 lbs. to 3 tons capacity.

**C. Kielsmeier**, Diller, Neb., wants gasoline and electric cars.

**Commercial Motors Company**, Des Moines, Ia., wants electric cars of 1000 to 6000 lbs. capacity.

**J. A. Scott**, 443 S. Figueroa St., Los Angeles, Cal., wants gasoline cars of 1 to 5 tons capacity.

**Glenn & Trevor**, 2414 15th St., Moline, Ill., want gasoline cars of 1000 lbs. up.

**Frank S. Bayne**, Mulberry, Ind., wants gasoline cars.

**Weitzel Auto Company**, 392 Poplar St., Atlantic, Ia., wants gasoline hotel buses of 1500 lbs. capacity, to sell at \$1000.

**Upham Corner Garage Company**, 610 Columbia Road, Boston, Mass., wants gasoline cars of 1000, 1500, 1 ton and 2 ton capacity.

**Horsman's Auto Repair Company**, 47 Day St., West Somerville, Mass., wants gasoline cars of 1 and 2 tons capacity.

**Empire Sales Company**, 821 W. Daugherty St., Webb City, Mo., wants gasoline cars of 1/2 to 3 tons capacity, to sell at \$750 to \$3000.

**A. C. Vanderpool**, 18 Broadway, N. Y. City, wants gasoline cars.

**C. L. Kerr**, Warsaw, N. Y., wants gasoline cars of 1 to 3 tons capacity.

**Red River Motor Company**, Wahpeton, N. Dak., wants gasoline cars of 1500 to 2500 lbs. capacity.

**Wm. Gackel**, Florida, O., wants gasoline cars of 2000 lbs. capacity, to sell at \$700 to \$1000.

**Floyd Miller**, Pocono Lake, Pa., wants gasoline cars of 1500 lbs. capacity, to sell at \$1000.

**O. K. Cole**, Cemetery St., Cottage Grove, Tenn., wants gasoline electric cars of 2 to 5 tons capacity.

**B. A. Carleton**, Main St., Center Ossipee, N. H., wants gasoline cars of various capacities, to sell at \$1000.

**Frank F. Bael**, 1061 S. Broad St., Trenton, N. J., wants gasoline cars.

**The Williams-Phelps Motor Company**, 1242-1250 Broadway, Denver, Colo., wants gasoline cars.

**Rochester Electric Light, Heat & Power Company**, Rochester, Ind., wants electric cars of 1/2 to 2 tons capacity.

**N. H. McLendon**, 37 Washington St., Fort Gaines, Ga., wants gasoline cars of small size.

**Maloy Machine Company**, Milan, Ga., wants gasoline cars of 1200 to 1800 lbs. capacity, to sell at \$550 to \$1000.

**Jones, Aldrich & Moreau Company**, Galesburg, Mich., wants gasoline and electric cars of 1 ton capacity, to sell at \$1000 to \$1500.

**Howell Auto & Repair Company**, Howell, Ind., wants gasoline cars of small capacity.

**Geo. L. Hovey**, North Anson, Maine, wants gasoline cars of medium capacity, to sell at not over \$2000.

**Ramm's Garage, Inc.**, St. Petersburg, Fla., wants gasoline and electric cars.

**The Auto Inn**, E. Van Buren St., Columbia City, Ind., wants gasoline cars of 1 ton to 1 1/2 tons capacity, to sell at \$1800.

**The Poltera Garage & Machine Shop**, Coldwater, Kan., wants gasoline cars of 1 ton capacity.

**Holly Motor Company**, Mt. Holly, N. J., wants gasoline and electric cars of 1/2 and 1 ton capacity.

**Chas. C. Brown**, Bloomington, Nebr., wants light gasoline and electric cars to sell at low price.

**Bostain & Sterling**, Cor. North & Brumbaugh Aves., Middlebranch, Stark County, O., want gasoline cars of 3/4 to 1 1/2 tons capacity, to sell at medium prices.

**Note.**—Inquiries of the above character will be inserted for our subscribers without charge of any kind.

This service, however, is only for subscribers and those wishing to take advantage of it and who are not subscribers, should send their subscription order and remittance with the necessary data for the notice. *Advertisement.*



Farm Tractor to the Rescue

The accompanying illustration shows one of the numerous expedients resorted to at Anderson. A carload of Lambert farm tractors were on the loading platform at their factory, for shipment to California, when the electric light and water plant were put out of business by the flood. One was immediately rushed to the office of the *Daily Bulletin* and a belt run in to the basement pressroom from the alley, and both papers, the *Herald* and *Bulletin* were printed on time. Another of the machines was attached to a centrifugal pump and after nine hours pumping, the water at the electric light and water station was lowered so that the water plant was gotten in operation, while a third one of the machines was used to keep the D. & M. telephone plant in operation. The fourth one was attached to a big dynamo in the Banner store, furnishing light and power for the block.

### FRENCH SUBSIDIES INCREASE

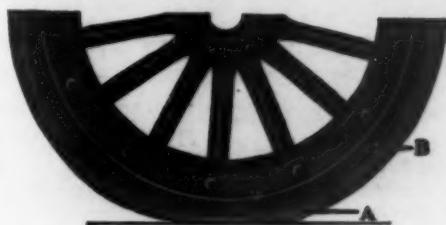
The increasing number of vehicles subsidized by the French military authorities under their subvention scheme, speak in a very eloquent manner as to the rapid increase of reliability in heavy automobile trucks. Each type of vehicle subventioned has to pass a severe test, which certainly does not get easier year by year, and yet the numbers subsidized have risen from 80 in 1910 to 300 in 1911, and 500 in 1912.



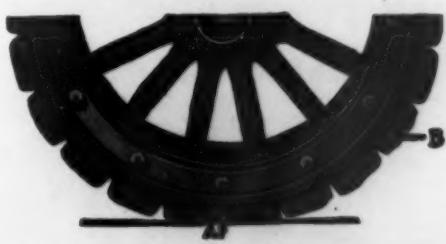
# Firestone

Continuous Base Notched Tread Truck Tires

For Heavy Service Truck Profits



Showing traction wave in ordinary continuous tire. (A) indicates where wave forms. (B) indicates base where roll and tread separation occur.



Showing how Firestone Notched Tires overcome destructive traction wave. (A) indicates wave passing off into space between blocks. (B) indicates continuous base — assuring absorption of vibration in every direction.

Mileage—that's the tire user's biggest desire, and the Firestone's biggest accomplishment. Study illustrations showing how Firestone Notched Tread Tire overcomes the bulge, or traction wave, which tears the ordinary tire away from channel in heavy duty.

The toughness of Firestone rubber also prevents the tearing and shredding of the tread by stones, car tracks or other obstacles.

Resiliency that protects truck mechanism, traction that reduces gasoline expense, and road grip that prevents skid, are added advantages.

*There is a Firestone Tire for Every Truck. There are Firestone Service Stations Everywhere for Firestone Users.*

Write for Truck Tire Book

**The Firestone Tire and Rubber Co.**

"America's Largest Exclusive Tire and Rim Makers"

Akron, Ohio—All Large Cities

# TRUCK ACCESSORIES AND APPLIANCES

## RICH TUNGSTEN VALVES

The Rich Tool Company, of Railway Exchange Building, Chicago, Ill., is making a specialty of valves, containing from 13 to 16 per cent. of Tungsten. It is claimed that this valve does not require regrounding as the heat in the motor never becomes great enough to draw the hardness from the valves on account of the Tungsten used. The valve is made in one piece only.

## NORTHWAY COMMERCIAL CAR MOTORS

Simplicity coupled with thoroughness is the keynote in the design and construction of the Northway motors, made by the Northway Motor and Manufacturing Company, Detroit, Mich. All material entering into the make-up of the Northway product is tested both in the raw state and after it is finished.

Two models are herewith illustrated which are designed to be used with trucks ranging from  $\frac{1}{2}$  to 1 ton capacities. The Model 30A plain truck motor is to be used with 1000 lb. delivery wagon. The specifications of this motor are, in brief, as follows: Four-cylinder, L-head, cast en bloc, 3 in. bore,  $4\frac{1}{2}$  in. stroke, rated at 15 h. p. (S. A. E.) or 20 b. h. p.; weight of plain motor 500 lbs.; any standard type magneto furnished; 1 in. carburetor of standard size; thermo-syphon cooling system; positive plunger pump oiling system. The fly wheel is  $16\frac{1}{4}$  in. in diameter with 3 9-16 in. face. This motor is also furnished complete with three-speed and reverse selective transmission, and leather faced cone

clutch. This outfit is known as Model 30B. The Model 36 unit power plant includes a four-cylinder, L-head, cast en bloc motor,  $3\frac{1}{2}$  in. bore by 5 in. stroke, rated at 20 h. p. (S. A. E.) or 28 b. h. p. The complete weight is 550 lbs. The cooling system includes a centrifugal pump.

## THE NEW-MILLER CARBURETOR

This carburetor, which is the product of the New Miller Carburetor Company, of Indianapolis, Ind., is designed to always have a normal air around the nozzle, with



The New-Miller Carburetor

in the nozzle. This is done from the seat of the car with the steering post adjustment. In other words, the proportion of air is maintained, and to equalize the gas vapor, owing to weather conditions and grades of gasoline, the quantity of gasoline is increased or decreased.

The manufacturers call special attention to the extreme care taken in the construction of this carburetor. It is made in five sizes 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ ,  $1\frac{3}{4}$  and 2 in., listing at \$14, \$22, \$25, \$30 and \$50, respectively.

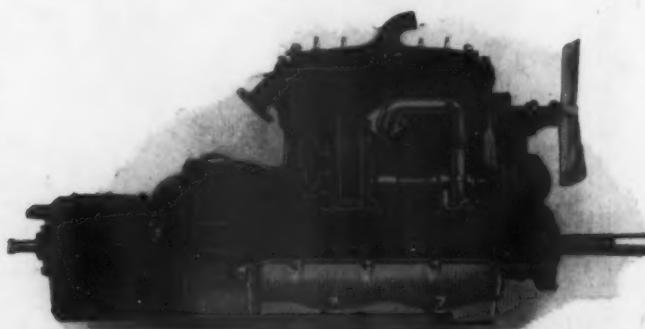
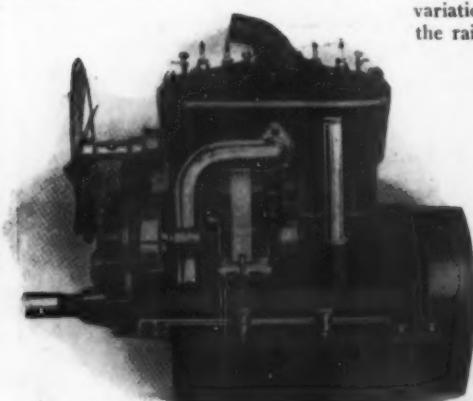
The steering post control lists at \$2.50. This is designed especially to facilitate priming from the seat.

## HERROLINE—A GASOLINE IMPROVER

The Improved Gasoline & Oil Manufacturing Company, of 1522 Michigan Avenue, Chicago, Ill., manufactures a liquid called Herroline, which is mixed with gasoline, giving the latter, it is claimed, 50 per cent. more efficiency. It is also said to keep the spark plugs, valves and cylinders permanently free from carbon deposits. The compound sells for \$5 per gal. and \$1.50 per qt.

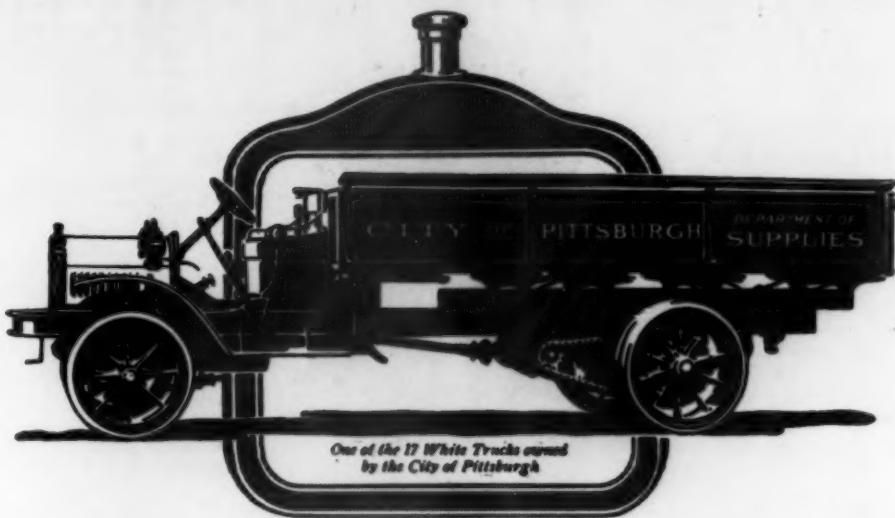
## GOODRICH BLOCK AND ENDLESS TIRES ON SAME RIM

In showing its 1913 line of Block and Endless tires for commercial cars, the B. F. Goodrich Company, of Akron, O., calls especial attention to the fact that these tires interchange, and either one or the other can be used on the same rim. This feature is of inestimable value to the truck owner whose truck is operated under varying road conditions during different seasons.



Northway Four-Cylinder Power Plants Designed Especially For Commercial Cars

On the left is illustrated the Model 30-A plain truck motor, designed especially for use with a one thousand pound delivery wagon. The illustration on the right shows the Northway Model 36 Unit Power Plant, with four-cylinder motor,  $3\frac{1}{2}$  in. bore, 5 in. stroke.



## The Final Choice of the Discriminating Purchaser

After trying out several different types of motor trucks for the past two years, The Atlantic Ice and Coal Corporation, of Atlanta, Georgia, has recently ordered fifteen White Trucks for immediate delivery.

Responsible firms prefer to purchase truck equipment from responsible manufacturers. This is one of the reasons why the final choice of the discriminating purchaser is invariably White.

Another point of importance is the fact that White Owners continue to buy White Trucks. When Whites are used, experimentation ceases.

White Trucks are the most economical trucks to operate.

**THE WHITE COMPANY**  
CLEVELAND

*Manufacturers of Gasoline Motor Cars, Trucks and Taxicabs*

### THE HERZ TAPE GRIP RING

Herz & Company, of New York City, recently placed on the market a coupling for making watertight connections between the radiator and the motor. This device can be quickly applied and gives the job a finished appearance.

This new device is known as the Herz Tape Grip Ring and consists of a metal ring with raised knurled edges, slotted on one side for the reception of ordinary tape. The rim is fitted with a flange on the inside to allow the end of the hose to slide against it. To make the coupling it is only necessary to slip the tape grip ring over the end of the rubber hose until the end of the hose butts against the flange inside of the rim, the ring is then given as many turns as necessary to fill up the space between the inside of the rim and the outside of the rubber hose, layer upon layer being put on until the joint is made. This device is made in various diameters from 7-8 to 4 in. and lists at 20 to 70 cents each, according to the size.

### KOKOMO THICK TREAD INNER TUBE

The Kokomo thick tread inner tube, manufactured by the Kokomo Rubber Company, Kokomo, Ind., and illustrated herewith, is adapted particularly to pneumatic tire equipment used on delivery wagons, fire apparatus, and other municipal apparatus. This tube is claimed to eliminate pinching, reduce the number of punctures and blow-outs, and strengthen the casing. It is made in a mould, of high quality materials, is very thick where most needed, and requires less air than the ordinary tube. Sizes from 30 x 3 in. to 37 x 5½ in. are listed at \$9.20 to \$31.65, respectively.

### U. S. BALL BEARINGS

The U. S. ball bearing is manufactured by the U. S. Ball Bearing Company of Oak Park, Ill., which company is represented in Cleveland, Detroit and Chicago by Denton & Flagg.

This bearing is made in radial or annular type; for magneto and generator bearings; in adapter style; grooved end thrust bearings and thrust collar bearings.

Attention is called to the accompanying illustration which shows the U. S. patented adjustable retainer, the feature of which



**The U. S. Retainer**  
This retainer can be adjusted for different size balls and allows the removal or replacement in a very easy manner



The Herz Tape Grip Ring



**Section of the Herz Tape Grip Ring**  
This view shows the manner in which the tape compresses the rubber hose at the end, giving the joint a very neat and finished appearance



No. I.L. Interlock Flexible Metal Hose



Kokomo Thick Thread Tube

is that it can be adjusted so that the balls may be easily removed and inserted by the very simplest method and without any possible danger or injury to the retainer. Should different size balls be desired it is only necessary to open the jaws adjacent to their seats, thus permitting the balls to be removed. In order to lock the inserted balls in their seats the jaws of each individual seat are closed. This retainer is of light and simple construction and is particularly adaptable where very high speeds are demanded such as bearings for magneto electric motors, etc. In some of the other bearings manufactured by this concern a patented separator is used which is novel in construction in that it allows the use of 95 per cent. of balls in the races.

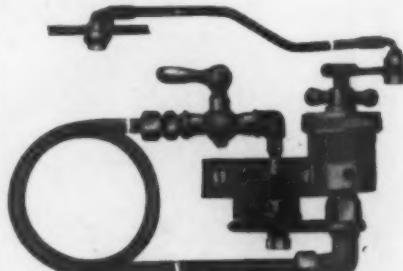
### BREEZE FLEXIBLE METAL HOSE

The Breeze Carburetor Company, 250-252 South Street, Newark, N. J., is calling particular attention to its No. I.L. interlocked flexible metal hose for use on commercial cars, in connection with the exhaust or for heavy pressure and hard service. This hose is made in ten sizes from 3-16 in. up to 2 in. inclusive. In steel the prices are 12 cents to \$1.80 per foot, while in brass composition the prices are 16 cents to \$3.60 per foot. For tire pressures and rough wear the same hose is furnished in braided style, which lists at 50 cents additional to the prices quoted above.

No. G. S. flexible metal hose is designed especially for gasoline or whistle use. It is guaranteed absolutely against leakage and will stand about 200 lbs. pressure. It is furnished in lengths only with connectors, and no longer than 15 ft. It is absolutely smooth in the inside bore, and is made in 1/4 in. size at 60 cents a foot, and in 5-16 in. at 70 cents per foot. Connector soldered on of 1/8 and 1/4 in. internal pipe thread lists at 60 and 70 cents respectively. This company also manufactures a complete line of metal hose for auto radiator connections, gas lamp connections, etc.

### THE GO MOTOR SPEEDER

This device is designed to increase the efficiency of the motor by reason of the fact that it breaks up the mixture into a more homogeneous mass. The device consists of an automatically regulated air valve which is operated from the carburetor throttle rod; a coil of copper tubing which is wound around the exhaust pipe which in turn connects the air valve with a spray nozzle, the latter being screwed into the intake manifold. When the motor is in operation a column of warm air is forcibly sucked into the intake pipe through the hole in the air valve chamber. The amount of air is regulated of course by a valve in the air chamber. The device can be set so that just the right amount of air enters and the air supply is kept in corresponding ratio with the amount of gasoline taken from the carburetor. This device will vaporize gasoline as well as kerosene and is claimed to reduce the gasoline consumption 25 to 50 per cent. The outfit can be installed in less than an hour and lists complete, ready to install, finished in black enamel and brass at \$10. It is manufactured by the Fudge Brothers Manufacturing Company, Marion, Ind.



**The Go Motor Speeder**  
Showing the complete outfit, which consists of air valve chamber and its bracket; tie rod, tubing and spray nozzle

# **"Use KEROSENE as Fuel"**

## **THE G. C. Vaporizer**

**Successfully Runs ANY Gasolene Engine on KEROSENE,  
DISTILLATES or HEAVY OILS. Cuts Fuel Cost in  
Half. Gives Increased Power With Same Flexi-  
bility as Gasolene. No Carbon, Odor nor Smoke**

This celebrated European Vaporizer is regularly used by England's biggest and most conservative motor truck builders and users—including the British Government itself.

It can be easily attached to ANY gasoline engine—new or used—without change in design or construction.

Famous Continental truck builders, such as Thornicroft, Hall, Lacre and Halley—big express companies like Pickford and Carter-Patterson—such railroads as the London Northwestern and the Midland Railway—have tested the G. C. VAPORIZER under every condition. As a result of these tests, they now use the **G. C.** regularly on their cars and trucks.

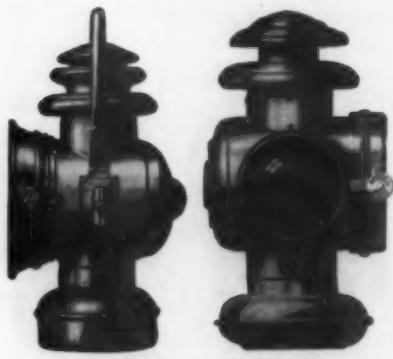
The G. C. VAPORIZER completely overcomes every vaporizing and lubricating difficulty heretofore encountered in using kerosene. We absolutely guarantee its perfect service.

**Write us today for full details of this  
extraordinary motor improvement**

**G. C. VAPORIZER COMPANY  
of America, Inc.  
1790 Broadway, NEW YORK**

### NEW SOLAR LAMPS FOR COMMERCIAL CARS

The Badger Brass and Manufacturing Company, of Kenosha, Wis., has for the 1913 season made a few additions in its line of commercial car lamps, the same being illustrated herewith.



Solar Oil Side and Tail Lamps

The Security Oil Tail Lamp is made entirely of heavy drawn brass riveted throughout. It is  $9\frac{1}{2}$  in. high, has  $3\frac{1}{4}$ -in. white lens on right to show number, and a 3-in. ruby rear lens and an aluminum reflector. The Solar patented safety oil fountain catch is fitted as well as a standard combination prop for round or flat bracket. This lamp is also furnished in combination style, being fitted as such with a 3 c. p. six-volt Edison Mazda Bulb and Switch Plug Connector to comply with the Chicago ordinance. This lamp lists as follows: Brass, \$3.25; black and brass, \$3.50; black and nickel, \$3.75; nickel, \$3.90. For combination style add \$1.50 to these prices.

The Solar Commercial Oil Side Lamp is 12 in. high,  $5\frac{1}{4}$  in. front glass,  $1\frac{1}{2}$  in. rear ruby signal with aluminum reflector. This lamp will burn 32 hours. It is made of heavy grade brass and can be supplied on special order with signal combination

prop for round or flat bracket. The prices range from \$10.50 to \$13.75, depending on the finished type of lens and bail.

Solar Motor Car Search Light is recommended for use on trucks as a center light in place of headlight, also to light street numbers. It is made in three styles, Nos. 967, 968 and 869. No. 968 is designed especially for fire chief's car and telegraph, telephone and street railway repair wagons, and No. 869 for power or hook and ladder wagons. This lamp can be fitted with Parabolic silver reflectors and 18, 21 or 24 adjustable focus Ediswan Mazda electric bulbs at \$2.50 each extra. This lamp is mounted in brass fork brackets which allow



Solar Motor Car Searchlight

combined vertical and lateral movements. Thumb nuts are provided for locking in any position.

Either brass, black and brass, black and nickel, and plain nickel finishes can be had. The prices range from \$17.25 to \$17.50.

### THE V-RAY MICA-LAVA PLUG

The feature of this plug lies in the fact that no porcelain or mica is exposed to

the cylinder's heat. There is no chamber or recess of any kind in the shell exposed to the cylinder, as the lower part of the plug consists of a solid block of flint-like lava, from which the electrodes protrude. The only mica used in this plug is that which extends above the top of the spark plug shell. This upper part has six cylindrical layers of sheet mica wrapped about the center stem before the mica washers are put on.

The terminal cap fits all cable terminals and has a unique self-cleaning feature attached thereto. The 1913 V-Ray electrodes are of uniform length and will fit all valve clearance in any motor. The plug comes in four sizes, the  $\frac{3}{8}$  in. Standard, Metric, S. A. E. and Standard Motor-

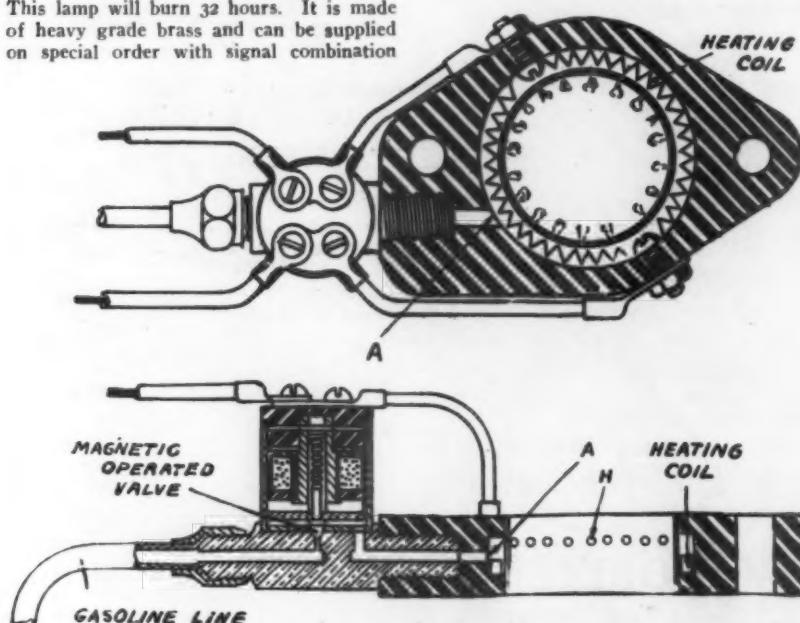


Sectional View of the V-Ray Mica Plug

cycle types, and sells at \$1.25. The V-Ray Porcelain plug has been reduced from \$1.25 to \$1.00.

### A NEW VAPORIZER FOR GASOLINE AND KEROSENE

One of the latest devices placed upon the market for the purpose of assisting in starting motors is pictured by the accompanying illustration. One of the main features of this device, which is known as the Tate Electro Vaporizer, is that it will quickly vaporize gasoline or kerosene, so that the engine can be started by the first turn of the crank, even though the poor grade of fuel now on the market is used. This device does not only heat the air in the intake manifold, but vaporizes gasoline or kerosene, as the case may be, so that the intake pipe is charged with a warm gasified mixture. This vaporizer is intended for starting purposes only, and is not intended to be used for running on steadily, although the engine can be run on it until it picks up its own gas or kerosene from the carburetor. The device consumes about 5 amperes and can be operated from any six volt battery. The illustration clearly shows the working of this device. The magnetic valve shuts off the flow of gasoline the moment the current is turned off. This device is manufactured by the United Motors Equipment Company, 19 S. La Salle Street, Chicago, Ill.



The Tate Electro-Vaporizer

Sectional views of this device, which is located between the carburetor and manifold. Closing dashboard switch allows current to pass simultaneously through the magnet coil and heating element. The gasoline coming in contact with the heated element is vaporized and ejected through holes H and mixed with air drawn into the manifold while the engine is being cranked.



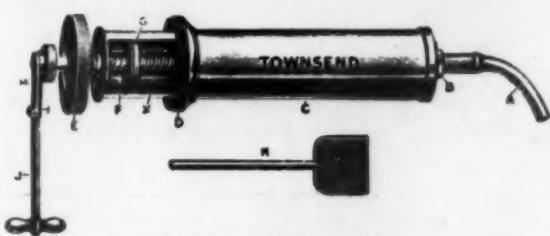
New Gemmer Commercial Car Steering Gears, Models R2, O2 and K2

The Gemmer line of steering gears, made by the Gemmer Manufacturing Company, of Detroit, Mich., has been supplemented by three new models, illustrated above. The three gears are of the worm and full-wheel type and are shown with outside control. Inside control optional on models R2 and K2



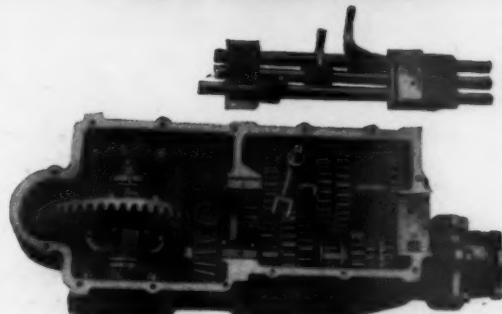
Goodyear Demountable Cushion Truck Tire

The latest product of the Goodyear Tire & Rubber Company, of Akron, Ohio. This tire fits the S. A. E. standard rim. It is designed with slantwise bridges and undercut sides or pockets which provide the necessary space for the displaced rubber. The soft rubber tread is moulded onto a hard rubber base which in turn is fastened to the steel base.



The Townsend Grease Gun

The gun is loaded by simply unscrewing the cap E, separating the cylinders, and filling the inner tube with the paddle K. The tubes are then telescoped and the cap E screwed to funnel D. The gun can then be operated by simply turning handle J.



Warner Model T-28, Three-Ton Combined Transmission and Differential

The illustrations above show the new three-ton commercial transmission and differential unit, made by the Warner Gear Company, of Muncie, Ind. The transmission has four speeds forward and reverse, with direct drive on third speed. The gears in the whole unit are of chrome-nickel steel.

#### THE TOWNSEND GREASE GUN

The feature of this gun lies in the fact that it can be quickly filled and discharged, and that both operations can be performed without the accompaniment of soiled hands and clothing. The cylinders are made of seamless brass tubing. The gun is furnished in four sizes, viz., 16 oz. capacity, \$5; 12 oz., \$4; 8 oz., \$3.50, and 6 oz., \$3. It is

manufactured by S. P. Townsend & Company, Orange, N. J.

The Pantasote Company, 11 Broadway, New York, make "Agasote," which is an artificial fibre recently introduced to the automobile body trade for both commercial and pleasure car bodies. This material is a fibre structure built up under high pressure and can be handled very much the

same as wood, that is, it can be planed, sawed, dressed, etc., and will take paint. It has, however, the advantage of not checking or cracking, as there is no grain. It can be steamed and bent, in fact, anything can be done with it which is now done with wooden panels. It is of greater tensile strength than wood, and therefore, panels of less thickness can be employed. The general framing construction is about the same as when wood panels are used.

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### HYDRAULIC TRANSMISSION TRUCK HAULS FORTY-FIVE TON LOAD

A remarkable trailer haul was made in New York recently by the La France hydraulic truck. The load consisted of a frame for the door of new vaults which are being put into a bank clearing house.

The frame was placed upon a four wheel wagon, which itself, empty, weighed 16,400 lbs. The frame was 7 ft. 6 in. wide, 9 ft. long, and 3 ft. 6 in. thick and this frame weighed exactly 52,600 lbs. The La France hydraulic truck was loaded with five steel plates for this vault, which in the aggregate weighed 12,100 lbs. The La France truck itself weighs 4½ tons, so that the total load to be moved was 90,100 lbs. This

load was pulled at a rate of 4 m. p. h., and if done with horses it would have required at least twenty, while the speed would have not been over 2½ m. p. h.

Two horses were hitched to the pole of the truck so as to control this pole and keep the trailer steered right. A grade of 4½ per cent. was encountered on Broadway at Bowling Green, just above Beaver Street. The frame was placed upon timbers mounted on the truck and the load was so heavy that it crushed the timbers and the load had to be stopped and the frame jacked up and new timbers placed underneath.

**WANTED—1912 PIERCE FIVE-TON TRUCK IN FIRST-CLASS CONDITION. "PIERCE," CARE OF THIS JOURNAL.—Adv.**

**S E A M L E S S**

**MOTOR TRUCK**



**S COMPRESSED AIR MOTOR TRUCK STARTERS COMPLETE**

**GASOLINE TANKS**

**LEAKLESS**

**STRONG AND STURDY FOR ROUGH SERVICE**

**ALL SIZES IN STOCK**

**AIR PRESSURE RESERVOIRS FOR**

**SELF-STARTERS AND GARAGE TIRE FILLERS**

**New Catalog Now Ready—Write Us**



## Good Selling Trucks —and— Good Trucks to Sell

That's what Kelly Trucks mean for YOU. There are three big reasons why Kelly Trucks are good trucks for you to sell.

1. Kelly Trucks are made right.
2. Kelly service is behind them.
3. Kelly will sell them for you.

Our new water-cooled models were the sensation of the New York, Chicago, Philadelphia, Omaha, Kansas City and other big shows. In fact, they led the procession wherever they were shown.

### WHY?

Because Kelly Trucks embody every feature which makes for truck efficiency. There is not an experiment anywhere. Every part of the truck is technically and fundamentally correct.

The new Kelly is the result of years of the hardest kind of work and investigation by our competent engineering staff. Every lesson that we have learned in our seven years of exclusive truck making shows in our new models.

If you want to make money in selling trucks, get the Kelly agency in your community.

Wire or write us immediately.

### THE KELLY-SPRINGFIELD MOTOR TRUCK COMPANY

602 Burt Street      Springfield, Ohio

(17)

# KELLY TRUCKS



BESSEMER MODEL "B"—3000 lbs. CAPACITY

## THE BESSEMER TRUCK

BUILT IN THREE SIZES

1000 lb., \$1200	2000 lb., \$1800	3000 lb., \$2100
102" Wheelbase	120" Wheelbase	136" Wheelbase

A FEW OF THE MANY FEATURES OF BESSEMER CONSTRUCTION:

Long-Stroke Continental Motor	Nickel-Steel Gears Mounted on
Timken Axles and Bearings	F & S Bearings
Left-Side Drive	Platform Springs
Center Control	Accessibility of Working Parts
Unit Transmission and Jack-shaft Housing	

Now, Mr. Dealer, in simple justice to yourself you should investigate the Bessemer. You will find it is the best way to make money for yourself and save money for every one to whom you sell a truck. Our contracts are plain, man-to-man agreements. We ask you to sign nothing we would not sign ourselves.

## AGENTS WANTED

BESSEMER MOTOR TRUCK CO., Grove City, Pa.

New England Branch: 56 Church Street, Boston, Mass.



## Motor Trucks

## THREE EXCEPTIONAL MODELS

Model ED. 1000 lbs. capacity (2 cyl.)	\$750
Model B, 1000 to 2000 lbs. capacity (4 cyl.)	1,100
Model C, 2000 to 3000 lbs. capacity (4 cyl.)	1,775

Write us for full information and liberal specifications

The Dart Motor Manufacturing Co., Waterloo, Iowa

18

THE  
RUTENBER  
Motor

Manufactured since 1901 for high-grade

### Automobiles and Trucks

$3\frac{3}{4} \times 5\frac{1}{4}$  four and six cylinder  
 $4\frac{1}{4} \times 5\frac{1}{4}$  four and six cylinder  
 Standard or Unit

and  
 $4 \times 4$ ,  $4\frac{1}{2} \times 5$  and  $4\frac{1}{4} \times 5$  Standard Types  
 All L-Head, 4-Cycle

Manufacturers are invited to investigate our  
 service and our facilities. Literature on request.



The Rutenber Motor Company, Marion, Indiana

## The BROWN Commercial Car

1500 lbs. Capacity—Powerful as a  
 $1\frac{1}{2}$  Ton Truck

### Internal Gear Drive

Every business man has dreamed of an efficient delivery service maintained by powerful and reliable trucks, but the enormous upkeep expense of larger trucks has obstructed the realization of his dream.

THE BROWN COMMERCIAL CAR is on the market to meet the demands of the merchant who wants rapid, reliable, uninterrupted and economical service.

Write for specifications and complete description

The Brown Commercial Car Co.  
 PERU, IND.

**D**O you buy your lubricants on a basis of low first cost or on a basis of ultimate economy?

When you decide to buy a lubricant because of efficiency and dependability rather than because of cheapness, you are on the straight road to economy.

Keystone Grease is slightly higher in first cost than other lubricants, but is specifically guaranteed to go farther with less attention and give more service in lubrication than any other lubricant, whether it be oil, grease or compound.

Keystone Grease and Motor Oil may be procured from any reliable dealer or garage, or from any of the following branches:

PHILADELPHIA (Auto Dept.)	1327 Race Street
PITTSBURGH	Jenkins Arcade Building
NEW YORK CITY	1777 Broadway
CHICAGO	2132 Michigan Avenue
NEW ORLEANS	610-12 Chartres Street
BOSTON	284-290 Franklin Street
DENVER	First National Bank Building
KNOXVILLE, TENN.	104 Tennessee Avenue
SAN FRANCISCO	268 Market Street
SYRACUSE, N. Y.	487 South Salina Street



**KEYSTONE LUBRICATING CO.**

*Executive Offices and Works*  
TWENTY-FIRST, CLEARFIELD & LIPPINCOTT STREETS  
ESTABLISHED 1884

PHILADELPHIA



## HOW ABOUT THAT WASTE?

Do you realize there is more waste than you actually see? There is a given amount of power-producing energy in every gallon of gasoline. With the ordinary above-ground, "air-tight," faucet tin tank, can, barrel, etc., a part of that power escapes. Gasoline stored in this manner fluctuates with the temperature 15 to 20° F. every twenty-four hours. Vapor forms for the same reason that it forms on a body of water. This vapor is the power-producing part of the gasoline you buy.

### HARNESS THAT ENERGY—SAVE YOUR LIQUID MONEY

Your truck investments have cost money—you want the maximum amount of service from them. The ordinary containers for gasoline—and oil—are wasting money that could otherwise be saved. Your gasoline is wasted through vaporization. They are no more adapted for storing and distributing these expensive liquids than a pasteboard box is a burglar and fire-proof safe.

### OVER ONE MILLION BOWSER SYSTEMS IN USE TODAY

Like yourself, the individuals composing this army were discriminating buyers—they recognized, when shown, the necessity of installing a Bowser System.

### POSITIVE PROOF OF BOWSER QUALITY

The U. S. Government, Post Offices, City Fire Departments and Trucking Companies have installed BOWSERS and are making money by it—SO CAN YOU.

### THE BOWSER GASOLENE FILTER

eliminates all water and foreign substances, thus insuring clean gasoline.

### THE BOWSER GALLON METER

keeps an accurate check on every drop of gasoline used and the pump locks, thus preventing its operation by an unauthorized person.

### A BOWSER SYSTEM IS INSURANCE

They are built to conform to that measure of safety prescribed by the National Board of Fire Underwriters. The premium is paid but once. Then they soon begin to pay you a premium. Besides, they actually reduce your present insurance rates—something for you to think about now. Investigate the Bowser System. Ask for details. Send for free illustrated book.

**S. F. BOWSER & CO., Inc.,** Home Plant and General Offices, **Box 2118, Fort Wayne, Ind., U.S.A.**

BRANCHES: Albany, Atlanta, Chicago, Dallas, Denver, Harrisburg, Minneapolis, New York, St. Louis, San Francisco, Toronto  
Original patentees and manufacturers of standard, self-measuring, hand and power-driven pumps, large and small tanks, gasoline and oil-storage and distributing systems, self-registering pipe-line measures, oil-filtering and circulating systems, dry-cleaners' systems, etc.

ESTABLISHED 1885

## NO WASTE WITH A BOWSER



When Writing, Please Say—"Saw Your Ad. in the C C J"

LOZIER

Packard

KISSELKAR

Baker  
ElectricStanhope  
MOTOR CARSThe  
Pierce-Arrow FIATStearns  
THE ULTIMATE CAR

Studebaker

Peerless

COLE

ALCO

National

All These Cars  
Are Painted With  
Valentine's  
Materials.

Not only those named here but the majority of the best automobile manufacturers in the country are using "Valentine's."

If the manufacturer used "Valentine's" painting materials to finish his car originally, doesn't it stand to reason that "Valentine's" are the best for refinishing it?

For hoods, fenders and underparts, "Vanadium Chassis" is the only finish not affected by soapy water, oil and mud. It retains its lustre,—that's what counts with owners.

Write for booklets on "Automobile Painting Systems" and "The Care of the Car."

Valentine & Company  
456 Fourth Avenue, New York

343 S. Dearborn Street  
Chicago

74 Pearl Street  
Boston

TRADE VALENTINE'S  
VARNISHES

WINTON SIX

Cadillac Stoddard-Dayton

MARMON Chalmers  
MOTOR CARS

# The Wichita Truck Abroad



SECONDO KIRBY  
STATION #33  
P. O. Box 113  
Talibano A. 5158

R. KIRBY & CO.  
HABANA, CUBA.

Jan. 17/13

Mr. J. G. Bullock, Genl. Mgr.,  
Wichita Falls Motor Co.,  
Wichita Falls, Texas, U.S.A.

Dear Sirs:-

We beg to advise that we have had one of your two ton trucks in use now for over six months and we are highly pleased at the work it is doing for us.

We have 8 of the finest teams in Habana and your truck does more work in a day than our three best teams. We have had but one day's repair bill on this truck since arrival. We intend to place an order with you for another truck in the near future.

Yours very truly,

R. Kirby & Co.  
D. M. Durkin

## Brief Specifications

### Model A

One Ton, 25 H. P.  
Chassis, \$1650.00

### Model B

Two Ton, 30 H. P.  
Chassis, \$2100.00

### Motor, 4 Cyl., Block Type

Bosch or Eisemann Ignition.

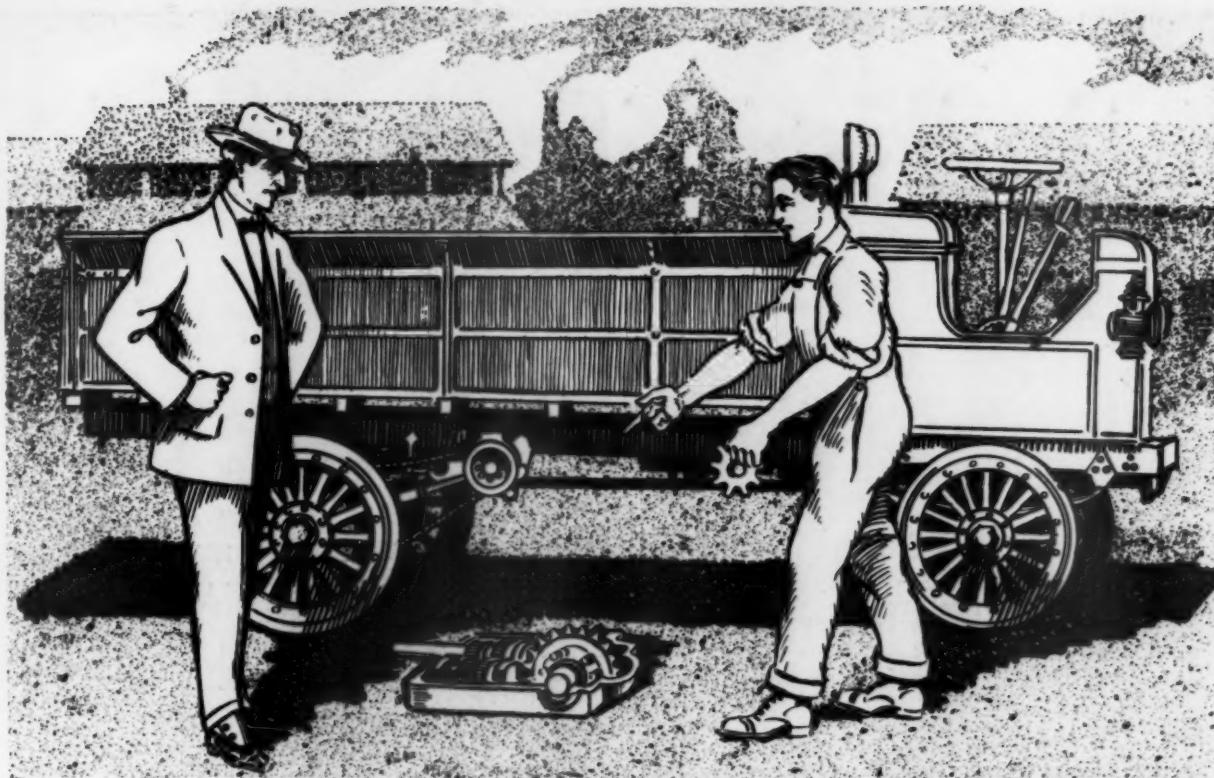
Pressed-Steel Frame.

Three-Speed Sliding-Gear Transmission.  
Wheelbase up to 144".

Standard Equipment includes tools, horn,  
oil lamps, dash searchlight, gas tank,  
Veeder Hub Odometer, etc.

*Write us for catalogue and agency  
proposition*

**WICHITA FALLS MOTOR CO., Wichita Falls, Texas**



## SOUNDS REASONABLE

*Owner:* . . . "How do you account for that wear?"

*Repairman:* "One of two reasons or both—inferior transmission or poor lubrication."

*Owner:* . . . "You can see for yourself it is the best make of transmission that can be bought and I have seen it myself frequently packed with grease."

*Repairman:* "You have already given the cause for that wear. Any transmission that needs frequent packing is not properly lubricated."

*Owner:* . . . "It was never dry. A sufficient amount was added to keep it from getting dry."

*Repairman:* "You are not the only truck owner who thinks his transmission and differentials are properly lubri-

cated if kept from getting dry. Just let me tell you something about lubrication.

Did you ever stop to consider the fact that the transmission heats up to 150 degrees and over while running?—and you know most greases will either turn to oil or gum at that temperature. A grease turned to oil does not properly lubricate—otherwise you would use oil instead of grease. A grease that will change to oil is made from a poor quality oil and will not lubricate when the transmission is heated up.

What is needed in every transmission and differential is a non-filled grease that will not gum with the highest melting test—and that grease is **Motorlight Grease**. It has a high melting test of 250 degrees and a low cold test of 50 degrees below zero. It will not channel, separate, splash, turn black nor turn to oil. It is a perfect lubricant and is guaranteed for 2500 miles. You get with it a guarantee for every claim. Just try it and you will have no more wear."

**PETROLEUM COKE COMPANY**  
Manufacturers of **Motorlight Grease** and **Motorlight Oils**  
Philadelphia

When Writing, Please Say—"Saw Your Ad. in the C C J"

# CRAMP



## Parsons' White Brass and Cramp's Special Bearing Bronze

These metals are used by the following companies among many others:

AMERICAN LOCOMOTIVE CO.  
PEERLESS MOTOR CAR CO.  
LOCOMOBILE CO. OF AMERICA  
WINTON MOTOR CARRIAGE CO.  
PACKARD MOTOR CAR CO.  
BENZ AUTO IMPORT CO. OF  
AMERICA  
MOON MOTOR CAR CO.  
OHIO MOTOR CAR CO.  
INTERNATIONAL MOTOR CO.

MAIS MOTOR TRUCK CO.  
CHALMERS MOTOR CAR CO.  
ALDEN SAMPSON MANUFAC-  
TURING CO.  
MACK BROS. MOTOR CAR CO.  
VELIE MOTOR CAR CO.  
NATIONAL MOTOR VEHICLE CO.  
R-C-H CORPORATION  
PULLMAN MOTOR CAR CO.  
HUPP MOTOR CAR CO.  
CHASE MOTOR TRUCK CO.

DORRIS MOTOR CAR CO.  
MERCER AUTOMOBILE CO.  
WOODS MOTOR VEHICLE CO.  
ABBOTT MOTOR CO.  
REO MOTOR CAR CO.  
INTERNATIONAL HARVESTER  
CO.  
SAURER MOTOR CO.  
OLDS MOTOR WORKS  
KLINE MOTOR CAR CORPO-  
RATION

These manufacturers have earned a reputation for their cars only by the expenditure of thousands of dollars and long years of hard labor. They cannot afford to risk this hard-earned reputation by the use of inferior metals— injury to a few cars would destroy the reputation of their entire output.

The experience of over three-quarters of a century in building engines has enabled us to give to the automobile industry absolute perfection in these two bearing metals.

PARSONS' WHITE BRASS is used by these manufacturers in the main engine bearings and connecting rods, and CRAMP'S SPECIAL BEARING BRONZE in the wrist pin end of connecting rods, axle bearings, transmission gear bearings, etc.

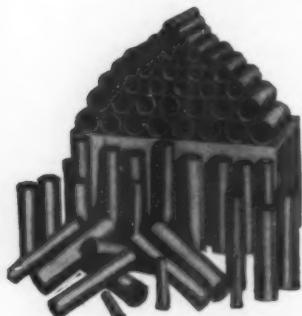
PARSONS' WHITE BRASS is the most durable metal manufactured. It is the hardest and strongest Babbitt metal, having a higher melting point than any other Babbitt. Moreover, PARSONS' WHITE BRASS, having twice the elastic limit of any other Babbitt metal under compression, resists without injury to itself the explosion of the gasoline motor. Notwithstanding these durability qualities PARSONS' WHITE BRASS has never been known to score a crank shaft, a very

valuable consideration when it is realized that a bearing costs a few cents while a crank shaft costs many dollars. The anti-friction qualities of our metal are unsurpassed. It gives extraordinary service because it has extraordinary qualities.

PARSONS' WHITE BRASS BEARINGS have been run for twenty years without material wear, in our marine engines, and there is a Packard car running in Philadelphia with the bearings untouched or unadjusted after seventy-five thousand miles of running.

In bearings where hard bronzes are required, CRAMP'S SPECIAL BEARING BRONZE should be used. Where the area is limited and the pressure is great, no bearing metal is equal to it. It has the quality of hardness, resisting wear and is of high elastic limit under compression resisting deformation.

Write for full particulars and list of automobile bearings for which these two metals are used.



For that break-down job we keep on hand a quantity of cored and solid bars furnished either in PARSONS' WHITE BRASS or CRAMP'S SPECIAL BEARING BRONZE.

ORDER BY TELEGRAPH  
SHIP BY EXPRESS

Cored bars of all sizes given are kept in stock and solid bars up to 2" diameter. Sizes of bars not shown in the list and cored whole and half bushings with end collars can be furnished from our numerous stock patterns. Order by number in first column, stating which metal and whether cored or solid bars are wanted.

### Cored Bars for Bushings

Order	Outside Dia.	Inside Dia.	Length
1	1 inch	1/8 inch	6 inches
2	1 1/8 "	1/8 "	6 "
3	1 1/4 "	1/8 "	6 "
4	1 1/2 "	1/8 "	12 "
5	1 1/4 "	1/2 "	12 "
6	2 "	1/2 "	12 "
7	2 "	1 1/8 "	12 "
8	2 1/4 "	1 "	12 "
9	2 1/4 "	1 1/8 "	12 "
10	2 1/4 "	1 1/2 "	12 "
11	2 1/4 "	1 1/4 "	12 "
12	2 1/4 "	1 1/2 "	12 "
13	2 1/4 "	1 1/2 "	12 "
14	3 "	2 "	12 "
15	3 "	2 1/2 "	12 "
16	3 1/4 "	2 1/2 "	12 "
17	3 1/4 "	2 1/2 "	12 "

Our guarantee of quality, uniformity and fair treatment is back of every casting sold

The William Cramp & Sons Ship & Engine Building Co.  
PHILADELPHIA, PA.

When Writing, Please Say—"Saw Your Ad. in the C C J"

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## IF YOU ARE STRIVING FOR EFFICIENT ECONOMICAL TRUCK SERVICE, LOOK TO YOUR WHEEL EQUIPMENT—

**Q** A truck without strong, reliable wheels, is like an athlete with sore feet. It is the wheels that receive the greater part of the jolts and jars, the twists and turns, the skids and strains of road service. They are the burden bearers, and the general all-around utility of a commercial vehicle can be no greater than their strength.

**Q** No matter what may be the price of a truck, its value to the owner is increased by SCHWARZ WHEEL equipment. No losses and disappointments because of inferior and inefficient wheels. No irritating and costly interruption of delivery service caused by wheel breakdown. A SCHWARZ-equipped motor vehicle carries a paid-up policy of insurance against breakdown.

**Q** All the leading motor vehicle manufacturers use SCHWARZ WHEELS, because they know they are getting the very best material; that the design and construction are correct; that the interlocking spokes, a distinctive feature of Schwarz Wheels, form a tight, immovable center assemblage, which cannot loosen, defies wear, and will always run true.

**Strongest, Safest, Most Economical**  
The Universal Verdict of All Automobile Engineers

Consult Us. Write for Literature

THE SCHWARZ WHEEL CO., Frankford, Phila., Pa.

When Writing, Please Say—"Saw Your Ad. in the C C J"

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L

S



JAMES BUTLER, the big New York Wholesale Grocer, is only one of scores of merchants in the grocery, food stuff and allied trades that are successfully using

**GMC**  
TRUCKS

James Butler bought his first GMC truck in January 1910. This was followed by orders at various times for one, two and three machines—until now 18 GMC heavy-duty trucks are working daily for James Butler.

It so happens that in Butler's service, where the hauls are long and the stops relatively few, heavy-duty gasoline trucks best combine efficiency and economy.

This, however, may not be true in *your* particular haulage or delivery. You may need some light-duty gasoline trucks or a heavy electric for short hauls. In either case you can find in the comprehensive GMC line a truck that will exactly fit your service.

Whether you are considering the present or future application of motor trucks to your business, you will be the gainer by writing today for our story.

*All GMC Trucks backed by the Largest Manufacturers of Motor-Propelled Vehicles in the World.*

## GENERAL MOTORS TRUCK COMPANY

Pontiac, Mich.

*Makers of Gasoline and Electric Trucks of all capacities*

BRANCHES:—New York      Boston      Philadelphia      Detroit      Chicago      Kansas City      St. Louis

When Writing, Please Say—"Saw Your Ad. in the C C J"



## When it comes to specifying or selecting batteries for "Electrics"-

don't forget that the storage battery is a most important part of the car. The cost of maintaining and operating an electric car, its ability to climb heavy grades, haul big loads and give satisfactory service in hot or cold weather are questions that to a very great degree relate to the battery. *The battery is the life of the car.*

Now here are some real interesting and *vital* facts concerning

### The 4 "Exide" Batteries

"Exide", "Hycap-Exide", "Tbin-Exide", "Ironclad-Exide"

which will show you why your interests will be best served by choosing one of them.

These batteries—the "Ironclad-Exide", "Exide", "Hycap-Exide" and "Tbin-Exide" have been designed and manufactured to exactly meet the varying requirements of all types of electric cars. *There's an "Exide" Battery for every "Electric."*

All four batteries represent years and years of study and experience by the best battery engineers in the country. They can be absolutely depended upon to give *unfailing* and *economical* service under all conditions.

These batteries are made by the oldest and largest battery maker in the country—the *same* company that has manufactured those enormous batteries used by the electric lighting companies in nearly all large cities. This is the best evidence of ability and experience.

One of the largest Central Station Batteries in the world is an "Exide" Battery, owned by the Consolidated Gas, Electric Light & Power Co., of Baltimore. This battery has a capacity of 7,500 H. P. The plates are of *exactly* the same type, except larger, of course, as those used in "Exide" Vehicle Batteries. Similar enormous "Exide" Batteries are used in New York, Chicago, Boston, Brooklyn, Minneapolis, Kansas City, etc.

Fifty-one street cars operated by The Third Avenue Railway Co. in New York City are equipped with "Hycap-Exide" Batteries, and during 1912 ran over 750,000 miles. A battery that will run a street car will *surely* give good service in electric cars.

"Exide" Batteries are used by the U. S. Government in the submarine boats of the navy and by many steam railroads for interlocking switch and signal service.

The majority of the prominent electric vehicle makers have *for years* used "Exide" Batteries. "Electrics" and "Exide" have become *inseparable*.

The storage batteries of this company's manufacture are by far the most widely used of any in the world, and are found in practically every city and town in the country.

You cannot do better than to choose for your "Electric" one of the four "Exide" Batteries and thus profit by the experience of the largest and most expert battery users in the world, who *year after year* have used batteries of this company's manufacture.

*Vehicle battery publications of VALUE to you  
mailed from the nearest Sales Office on request*

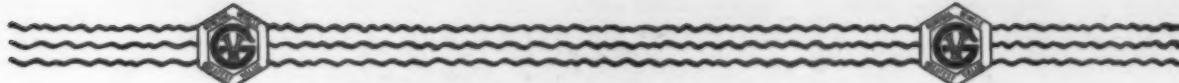
## THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of The "Chloride Accumulator," The "Tudor Accumulator,"

The "Exide," "Hycap-Exide," "Tbin-Exide," and "Ironclad-Exide" Batteries.

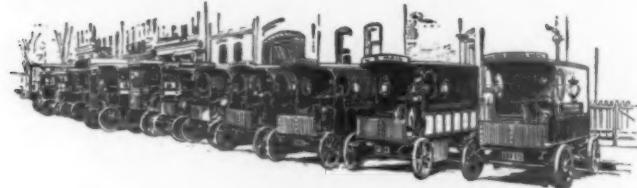
New York      Boston      Chicago      PHILADELPHIA, PA.      Denver      San Francisco      Seattle  
St. Louis      Cleveland      Atlanta      Detroit      1886-1913      Los Angeles      Portland, Ore.      Toronto

876 "Exide" Distributors      9 "Exide" Depots      "Exide" Inspection Corps



# G. V. Electric Trucks

- Give you 10 or more years' life.
- Are clean, silent and odorless.
- Operate 297 days out of the 300.
- Show economy in tires, parts replacements and general upkeep over a period of years.
- Promote the highest efficiency in systematic trucking, transfer work and light deliveries.
- Make possible undreamed of economies in real estate investment covered by stables and wagon yards.



Design standardized since 1907. All parts of each model interchangeable. Nearly 3000 in use, many ten years old.

The ex-teamster and the simple Electric are a saving over the complex motor vehicle and the expert chauffeur-machinist.

The Electric has economic law behind it and must dominate in its field. Show your business acumen by getting the right machine for the right place.

SIX CAPACITIES  
750 lbs. to 5 tons

*Catalog 84 on request*

## General Vehicle Company, Inc.

General Office and Factory, Long Island City, N. Y.

*New York*

*Chicago*

*Boston*

*Philadelphia*



When Writing, Please Say—"Saw Your Ad. in the C C J"

*THE*  
**Detroit**  
ELECTRIC



## Buy a Commercial Vehicle Suited to Your Needs

Detroit Electric commercial cars are installed to save time and money. They are doing it—every day, everywhere.

Does your delivery work require frequent stops?

Do your delivery vehicles enter congested city traffic?

If such is the case, you must consider the Detroit Electric commercial vehicles. **YOU WILL USE THESE CARS EVENTUALLY.**

Quick starting, quick stopping, no loss of power (Money) while standing. Great reserve force—hill-climbing ability. The simplest control—no gear shifting—your teamster can maneuver this car through the heaviest traffic.

There is one moving part in the Detroit Electric motor. Just stop and think what that means. Compare with the intricate motors and their hundreds of parts requiring constant adjustment and lubrication.

It is conceded that electricity is the most efficient, reliable, economical "fuel" used in any type of motor cars today.

The operating costs of the Detroit Electric commercial vehicle—per stop, per mile, per day, per year—are from 25% to 50% less than any city delivery vehicle on the American market.

Illustrated catalog and special information sent upon request.

**ANDERSON ELECTRIC CAR COMPANY**

456 Clay Avenue, Detroit, Mich., U. S. A.

*BRANCHES:*

Chicago - - - - - 2416 Michigan Avenue  
New York - - - - - Broadway at 80th Street

Evanston  
Kansas City  
Minneapolis

*Selling representatives in 175 leading cities*

Boston  
Buffalo  
Cleveland



## The Battery With the Mileage

What would you think of a vehicle battery that gave four years of continuous service without requiring any maintenance expense, except for electrolyte and distilled water?

### THE EDISON STORAGE BATTERY

is giving just this record as a matter of course. Maintenance of full ampere-hour capacity for four years' continuous service is guaranteed.

The Edison Battery gives indefinitely high mileage because it has a non-deteriorating element. It cannot sulphate, buckle, or shed its active material.

The Edison Battery requires no "renewal" because the cell is an all-steel structure.

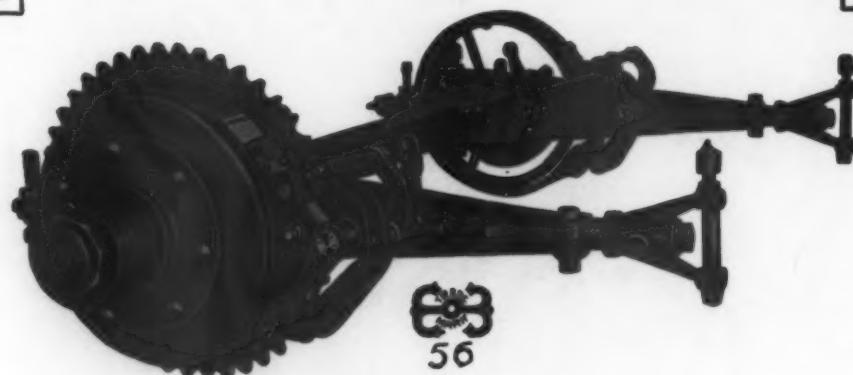
Is not this the Storage Battery for your cars?

**EDISON STORAGE BATTERY COMPANY**

141 Lakeside Avenue, Orange, N. J.

# ARMY TAKES NO CHANCES WITH JACK-SHAFT BRAKES

## SHELDON DOUBLE BRAKES ON REAR WHEELS PASS GOVERNMENT SPECIFICATIONS



Chief of Quartermasters' Corps of War Department issues specifications for Motor Trucks for Army use.

**"BRAKES—Two sets, both attached to rear wheels; one set operated by pedal, other by lever."**

The Army Takes No Chances With Jack-Shaft Brakes; by specifying both BRAKES ON REAR WHEELS.

SHELDON DOUBLE BRAKES ON REAR WHEELS conform to Government Specifications.

Equip your trucks with SHELDON BRAKES, and bid on the Army Requirements.

A Jack-Shaft Brake is no stronger than the chains. If the chain breaks or jumps the sprocket, will the truck stop? ? ? ? ? ?

You can never depend on jack-shaft brakes skidding the wheels—Either one of SHELDON'S DOUBLE BRAKES WILL DO IT.

**SHELDON AXLE COMPANY, Wilkes-Barre, Pa.**

CHICAGO OFFICE—68 East 12th St.

DETROIT OFFICE—1215 Woodward Ave.

SAN FRANCISCO OFFICE—444 Market St.



# The BIGGEST Cost of operating Motor Trucks



The biggest cost of operating motor trucks is not repairs, nor tires, nor fuel, nor oil, nor the combination of all of these.

All the elaborate cost-keeping systems which show wastes of these factors are good because, it is good to be economical.

But they miss the real point of motor truck operation—and for that matter the cost of operating horse wagons or any other form of investment in equipment.

The real cost of operating delivery is in **wasted time**—time lost at loading and unloading stations—time lost on the road—lost time which makes the waste of investment and overhead charges amount to more than the waste of fuel, tires, oil and repairs all combined.

In an analysis of eleven installations of motor trucks, the average productive time of operation was less than 4½ hours out of a 10½ hour day.

Based on the low average cost of \$1.00 an hour, here is a waste of \$6.00 a day per truck—unsuspected, because there was no accurate data on **wasted time**.

How it operates—the economies it will effect—the experience of its purchasers—will be told on request without obligation. Whether you operate one vehicle or one hundred—whether horse wagons or motor trucks, the **Servis Recorder** will save you money.

**Make us Prove this Statement**

## The Service Recorder Company

2424 East 105th Street Cleveland, Ohio

BRANCHES IN TWELVE CITIES

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# Continuous Service *not* Continual Adjustments

This tells in a nutshell why you'll get maximum efficiency in the use of



*Built on Steel  
Wear Like Steel*

# Goodrich Wireless Demountable Truck Tires

They were the original American steel base tires. We tested them out on our own trucks for three years before putting them on the market four years ago. Their absolute dependability has been proved over and over again,—and, of course, they are imitated.

## Buy the Original and Insure Certainty of Service

Hurried imitations have not yet been proved by the test of time and service. Get the proved dependability of Goodrich Wireless Truck Tires, gain peace of mind and save money.

They never have to be repaired. Never lay up your truck unexpectedly. Deliver more mileage per dollar cost than any other. They may cost you more, but remember it's cost per mile, not cost per tire.

## Booklets to Help You

Write on your business stationery today, for "Motor Trucks of America"—a condensed and authentic book of reference for the busy man who wants to make an investigation of motor trucks. Also write for the Goodrich Record Book and Cards. They'll enable you to tell just what your trucks are costing.

The way to reduce your cost of truck maintenance and do your trucking more efficiently is well told in our book, "Goodrich Wireless Demountable Truck Tires."

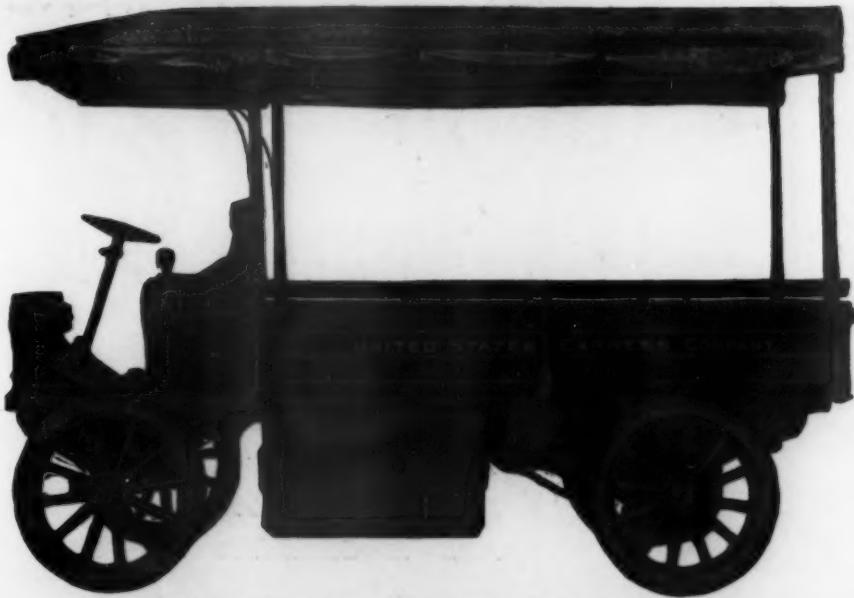
*Write for any or all of these books today*

## THE B. F. GOODRICH CO.

Makers of Goodrich Tires and Everything That's Best in Rubber

Branches in all leading cities

Factories: AKRON, OHIO



United States Express have been operating Lansden Trucks for 6 years.  
Adams Express have 162 Lansden Trucks—some 10 years old and are still giving good service



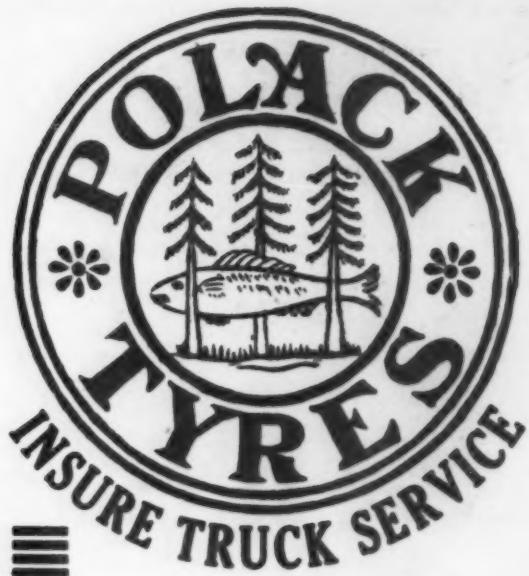
## Ten Years Continued Service

Has Proven the Lansden Electric Trucks to be the most reliable and Economic means of Transportation in all Lines of Trade.

Every effort in the design and construction of Lansden Vehicles is directed toward simplicity, reliability, and increased mileage and carrying capacity, with reduction of weight and current consumption. All of these tend toward better service and therefore lessen cost of operation and up-keep. In proportion to load capacity and mileage ratings the Lansden is the lightest high-grade electric commercial vehicle on the market.

The Lansden Electrics do not require a force of experts or a machine shop to operate and maintain them. They are operated at one-third less average cost than the gasoline. They will outlast any three gasoline trucks, with one-tenth the interruption of service.

**THE LANSDEN COMPANY**  
NEWARK, NEW JERSEY



INSURE TRUCK SERVICE

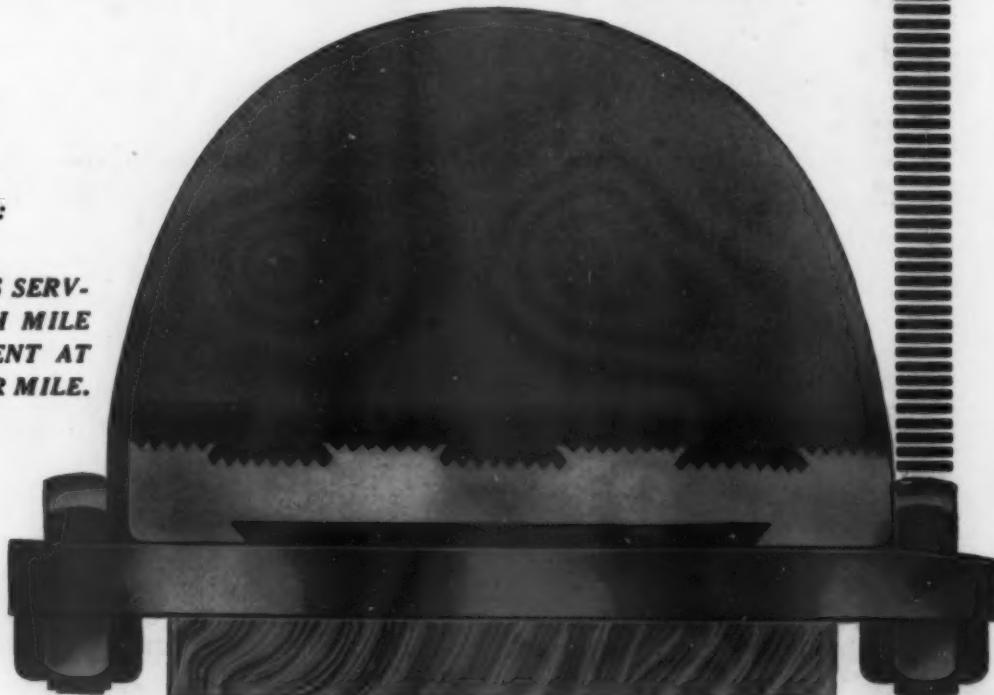
**EVERY POLACK USER IS SATISFIED**

**Because—**

**THE FINEST PARA RUBBER ONLY  
IS USED IN THEIR MANUFACTURE  
AND A GREATER VOLUME OF IT—**

**MINIMUM  
GUARANTEE:**

**10,000 MILES  
CONTINUOUS SERV-  
ICE AND EACH MILE  
MORE RESILIENT AT  
LESS COST PER MILE.**



**POLACK TYRE & RUBBER CO.**

Principal Offices:

**246 West 59th Street, New York**

Factory: Bridgeport, Conn.

Boston  
Philadelphia

Chicago  
Kansas City

Branches and Service Stations:

St. Louis  
Baltimore

Washington  
Detroit

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# VICTOR BLOCK TIRES

guarantee you

## Uninterrupted Truck Service

Worn block changed in a few minutes without removing load or even jacking up wheel. Just remove one bolt and replace worn block with new.



## MINUTES

VS.

## HOURS

Just compare the Victor way with the old-fashioned methods of other makers. Guarantee yourself against this loss.

**The Victor Rubber Co.  
Springfield, Ohio**

**ALL THIS INFORMATION  
About ALL CARS for ONLY \$1**

**1913 Table of Specifications of Gasoline Commercial Cars**

**PRICE, \$1.00**

Issued by **COMMERCIAL  
CAR JOURNAL** Published in Philadelphia

**Every Specification and Measurement of Every  
Commercial Car Manufactured.**

***Absolutely Complete* from Wheel Base  
to Size of Spark Plug.**

***How many times would you have given  
ten times its price for the facts about just  
one part of one car?***

Here is the measurement, capacity, tire equipment, control, cost, **everything**—about each and every commercial car manufactured, and costs you only \$1. Furnished as a wall-hanger, 4' x 2'-8", or in a convenient pocket size.

We also publish complete specifications of Pleasure Cars at the same price, in both hanger and pocket form. State which you desire, the wall-hanger or pocketbook size. If you order both the Pleasure Car and Commercial Car Specification Charts at one time, remit \$1.50, which is the special combination price. Order today before you forget.

**CHILTON COMPANY, PHILADELPHIA**

## THERE IS ONLY ONE OUTLAY

Each and every day after, you will be reaping over and over again the savings from that one outlay.



### PISTON RINGS

Will increase the horse power of your truck and cut down the running cost. ¶ You know that no engine will give its full power with lost compression. ¶ Leak-Proof rings will guarantee you perfect compression. They will stop that lost horse power that slips past the ordinary piston ring on each stroke of each cylinder.

Why not get full efficiency? Leak-Proof rings will give it and save you money

### "ASK THE USER"

¶ They will decrease carbonization and black smoke by keeping back oil from the exploding chamber. ¶ Tens of thousands in use are just what we claim—**LEAK-PROOF**.

#### DEALERS:

Leak-Proof Piston Rings are the cure for many motor ills.  
Write us for sales proposition.

### McQuay-Norris Manufacturing Co.

Dept. "C," 1309 Chestnut Street - St. Louis, Missouri

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## The Commercial Car Journal

is the logical paper for every man to read who contemplates buying or selling commercial motor cars.

It is brimful of essential information.

The Commercial Car Owner will also find many suggestions in it that will make his driving more efficient. Send for a sample copy.

### Commercial Car Journal

Market & 49th Sts.  
Philadelphia, Pa.

**It Is Not Profitable to Sell Trucks Unless They Are Good Trucks**

## LANGE TRUCKS ARE GOOD TRUCKS

### *Read a Few Facts Regarding Them:*

The Royal Laundry Company of Sedgwick Street, Pittsburgh, operated a Lange truck for a period of eleven months, covering 22,000 miles, at a cost for repairs of approximately 60c per 100 miles. They have just put into service a duplicate truck and are well pleased.

The Model Candy Company of Beaver Falls, Pa., operated a Lange truck for approximately eight months, without a cent for repairs; they have their second truck in use about 4 months. Both trucks cover 40 to 50 miles per day.

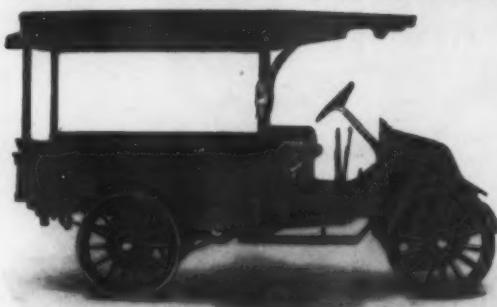
The Jones Transfer Company of McKeesport, Pa., and the Calhoun Ice Company of McKeesport, Pa., both run their trucks on a fixed schedule and for ten months have never missed a trip, nor been late on their schedule at any time. In the language of owners of the above trucks the expense has not been worth mentioning.

The Combination Chemical & Hose Truck in use by the Kittanning Fire Department, in a recent test with other well-known makes, took first place in speed, hill climbing and accessibility. It was pronounced the most handsome and finest truck in the field.

## Lange Motor Truck Company PITTSBURGH, PA.

**THE TRUCK BUILT ON EXPERIENCE**

## Simple—Reliable—Economical



### The MOORE Truck Capacity 1600 Pounds

The Moore Truck is designed to furnish reliable service at low upkeep expense. It is so simple that no high-priced man is required either to operate it or to keep it in condition. All its work is done quietly at a low motor speed which reduces noise, vibration and wear to a minimum. Write for descriptive circular.

**PALMER-MOORE COMPANY**  
SYRACUSE, N. Y.

## What is it Costing?

The growing merchant must know his costs; for cost knowledge is the basis of business.

### THE JONES RECORDER

is the basis of cost data for motor trucks. Every movement of the truck is shown in graphic form. Speeds, distances and delays are recorded by lines on the chart.

The Jones Recorder permits you to establish cost units for your delivery service—to know your costs per 100 lb. mile, or in any other unit most efficient for your business. We are always glad to supply more information and aid.

### THE JONES SPEEDOMETER

Broadway at 78th St., New York, N. Y.

PLANTS: Bush Terminal, Brooklyn, N. Y. New Rochelle, N. Y.

## Write For Full Facts

about the Republic Steel Base Motor Truck Tire before you decide the vitally important question of **which tire for your motor trucks**. Let us tell you why this tire cannot creep; why only external road wear can affect it; why chunks of the rubber tread cannot tear out; and why it will increase materially the efficiency of your motor trucks, saving you time, trouble and money. Write now.

**THE REPUBLIC RUBBER CO., Youngstown, Ohio**  
Branches and Agencies in the Principal Cities

**REPUBLIC**  
STEEL BASE  
MOTOR TRUCK TIRE

## Budd ALL STEEL Bodies

represent the last word in the art of truck body building. They stand for strength, stability, sturdiness and efficiency. Made entirely of steel, they will not rot or crack. They cannot warp or split. They will stand the maximum use or abuse and are practically indestructible. They eliminate fire risk. They are light in weight and easy on tires—pleasing in design and attractive. Summed up in a word, they give the highest degree of Service.

They are made in many styles—of any desired capacity. Estimates promptly furnished. Write us today for full information.

### Edward G. Budd Manufacturing Co.

Ontario and I Streets, Philadelphia, Pa.  
Detroit Office and Showroom, 796 Woodward Ave.

**ROSS**  
**STEERING and**  
**DIFFERENTIAL**  
**GEARS**  
 are standard on good  
 motor truck  
construction

WRITE FOR CATALOG

**ROSS GEAR & TOOL CO.**  
 790 Heath St. :: Lafayette, Ind.

**PRESSED STEEL**  
**FRAMES**  
 FOR TRUCKS

Handsome, Light, and  
 more enduring than those  
 made of rolled channel

**A. O. SMITH COMPANY**  
 MILWAUKEE

**"Reliable Springs are  
 More important on  
 Commercial Cars than  
 on Pleasure Cars."**



**THE PERFECTION SPRING CO.**  
 Cleveland - - - - - Ohio

**REMY**  
**ELECTRIC COMPANY**

(With a country-wide system of branches and service stations)  
 Designers and Builders of  
 High-Grade  
 Starting and Lighting  
 Equipment For Motor Cars  
 (Sold to car makers only)  
 Makers of magnetos for fourteen years  
 Our country-wide service is available to each user of  
 Remy equipment

Write us today about our magneto exchange offer. We will make a  
 liberal allowance for old equipment (any make)

**REMY**

Pioneer Manufacturers of Ignition Equipment  
 Factory and General Offices:  
 Anderson, Indiana

# Adams Trucks

"Deliver the Goods"



Bodies built to owners' specifications.

## Reorders From Old Customers Are the Acid Test of Merit

AFTER EXHAUSTIVE TESTS with Adams Trucks, the Public Service Gas Company of New Jersey now has eleven of our trucks in commission at various stations.

The Public Service Corporation has proved conclusively that these trucks are more efficient and cheaper than a horse-drawn vehicle.

Repeat orders for Adams Trucks were the result of carefully kept records proving their simplicity of operation, economy maintenance and complete reliability.

### THE ADAMS BROTHERS COMPANY

438 West Main Cross, Findlay, Ohio

First American Truck Manufacturers to use the French type hood (Radiator rear of the motor)

## We Ship on Approval

prepay freight and allow

### 30 DAYS FREE TRIAL

The best "Nonskid" puncture-proof device on earth for Commercial Cars.

Try them at our expense. Be your own judge—don't take anyone's word for it. "The proof of the pudding is in the eating."

### It Only Costs One Cent

to learn our unheard of prices and marvelous guarantee on "Brictson" Detachable Treads.

Write today for full particulars

**The Brictson Mfg. Company**  
4543 BRICTSON BLDG. BROOKINGS, S. D.

When Writing, Please Say—"Saw Your Ad. in the C C J"

## We Want Live, Business-Getting AGENTS AND DEALERS

In Every County in the United States  
To Handle Our Product in 1913.

There are more

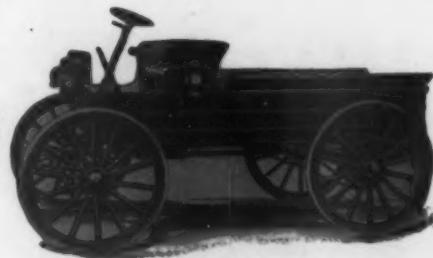
## MERCURY HALF TON TRUCKS

In use in Chicago than any other kind—  
You can equal this record in your Territory.

The Price  
of this  
Model

**\$750.00**

Write for  
Complete  
Catalogue  
and Agency  
Terms



**THE MERCURY MANUFACTURING COMPANY**  
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## Schafer Ball Bearings

"Famous for their Durability"

Radial or Annular Bearings for radial load only.

Axial or Thrust Bearings for axial load only.

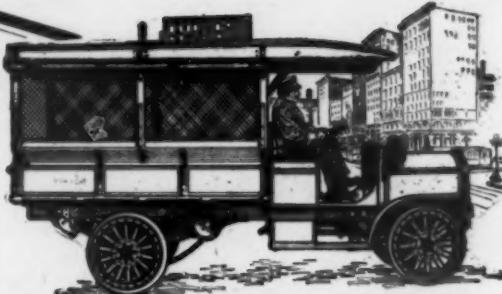
Diagonal or Combination Bearings for diagonal or combined axial and radial load.

There is a size and type of Schafer Bearing for every bearing service.

Write for catalog

## BARTHEL & DALY

Sole Importers  
42 Broadway New York



## Twenty-two Satisfied Customers Wrote Us in One Week

Just think of it! Twenty-two letters received from satisfied users of Avery Trucks in one week. All red-hot testimonials telling of the wonderful work their Avery Trucks are doing for them.

### Here are a few extracts from some of the letters:

"The cost of maintenance of our truck has been figured at \$30.00 per month average for 16 months including everything, oil, tires, repairs and all accessories. Jewel Stoneware Co., Omaha, Nebr."

"Having for 5 months over horse delivery, \$300.00. Glenrose Brewing Co., Glencoe, Minn."

"The expense for upkeep in the way of repairs parts has been practically nothing, and we find this truck is very economical in the consumption of gasoline and lubricating oil. Dyste Fruit and Produce Co., Minneapolis, Minn."

### And 19 More, Some Better Than These

Is it any wonder that Avery Truck sales are climbing and dealers are scrambling for territory, when we get letters like these? We now have a complete line of trucks ranging from a one to five-ton sizes.

If you haven't seen our new catalog you had better get one and find out about the Avery before you buy. Address

**THE AVERY COMPANY**  
950 Iowa Street, Peoria, Ill.



"THE ORIGINAL AND BEST ASBESTOS BRAKE LINING"

## Makes Your Car Safe!

YOU are always sure that your brakes will grip and hold if they are lined with RAYBESTOS. It is constructed of the best long fibre asbestos interwoven with copper wire. It is oil, water, heat and practically wear-proof, so you know it is always ready and will always work in an emergency.

**THE ROYAL EQUIPMENT CO.**

484 Housatonic Avenue  
Bridgeport, Conn.

We also make Duplex and Raymond Brakes and Gyrex, the Mixer



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**WAUKEsha**  
14-6½ LONG STROKE TRUCK MOTOR.

**E**FFICIENCY is the Waukesha Motor's best eulogy. It is efficient because it is constructed to give the utmost in service.

The Waukesha crankshaft has a tensile strength of 70 tons. The bearings have three times the wearing quality of ordinary bearings. Both these metals are our own processes. The rest of the motor is on par with these two features. When we can prove all this why not ask us to?

Why not learn that you can put a motor in your trucks that will exceed your broadest guarantees of efficiency, wear and economy of fuel? Your request will bring proof that will leave no doubt of the Waukesha Long-Stroke Motor's supremacy.

**WAUKEsha MOTOR CO.**  
WAUKEsha Dept. A. WISCONSIN

**AN EXCEPTIONAL MOTOR.**

**COVERT**  
**TRANSMISSIONS**

Made by Specialists

**COVERT TRANSMISSIONS GIVE** perfect service, because they are designed and built by men thoroughly acquainted with every requirement that is made by a motor car transmission.

For Commercial Vehicles of from 500 to 10,000 lbs. capacity.

For Pleasure Cars of from 20 to 60 H. P.

**Covert Motor Vehicle Co.**

Sales Office—Detroit, Mich.

Factory—Lockport, N. Y.

**Spicer**  
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**For Commercial and Pleasure Motor Cars**



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"INSURANCE FOR BUILDER AND USER"  
 RHINELAND MACHINE WORKS CO.  
 140 WEST 42nd ST. NEW YORK, N.Y.

GEBRUDER STOEWER ARIES KELLY NAGANT PANHARD PEUGEOT DELAHAYE MACK DE DIETRICH AUTO-METALLURGIQUE

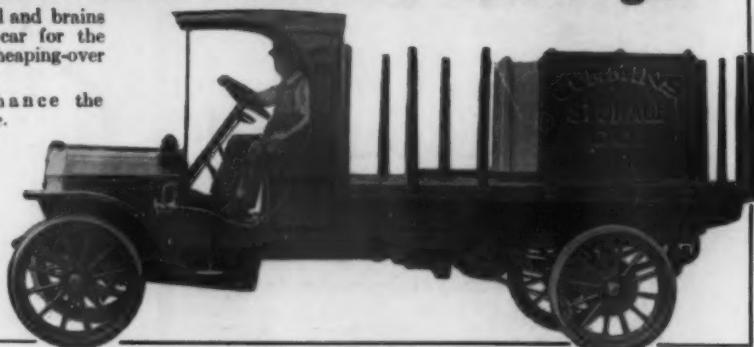
**The "MODERN" Truck Will Strike You Just Right!**

It's built right. The stuff is in it—both material and brains—minus all fuss and jinx-cracks. A practical car for the practical buyer—the man who likes to get heaping-over measure for his money.

The closer you investigate it the better chance the "MODERN" has of landing in your delivery garage.

**MR. DEALER:** An agency for the "MODERN" not only makes selling easy, but it brings you prestige. The "MODERN" is a live proposition for a live agent. Write today for some interesting facts we have to present to men who are in a position to sell trucks. And you men who are not selling trucks, we've got something to say to you. We say it in a way that grips and the illustrations that go with the talk will make you sit up. Write today.

**The Bowling Green Motor Car Company**  
 Dept. A Bowling Green, Ohio



**Decatur 1½ Ton Truck**

The Truck with a reputation for  
**Economy Efficiency Durability**  
 and **Low Operating Cost**

Our Trucks are used in 61 different lines of business.  
 Write for catalog and complete specifications telling  
**WHY DECATUR TRUCKS ARE BEST.**

**GRAND RAPIDS MOTOR TRUCK CO., GRAND RAPIDS, MICHIGAN**

When Writing, Please Say—"Saw Your Ad. in the C C J"



## Swinehart Cellular Truck Tires

Most resilient solid tire made. Absolutely non-skid. Increases traction and eliminates undesirable slipping and friction. Does away with the use of chains. The holes in the tire act as a radiator, preventing excessive heating and internal friction.

The extra large surface of the Swinehart tread reduces the pressure per square inch to a point well within the safe and economical limit.

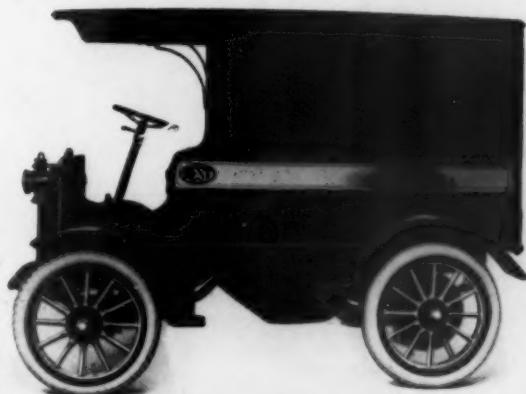
The wonderful elasticity, due to the combined use of our cellular design and the highest grade of rubber, allowing the tire to "give and take," to stand the road shocks without damage, is the true secret of Swinehart longevity. Demountable Quick Attachable.

We also make a full line of smooth tread and block tires, single and dual.

**THE SWINEHART TIRE & RUBBER CO.**  
AKRON, OHIO

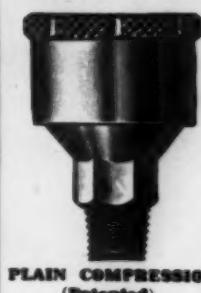
Boston Branch, 727 Boylston Street

## The "BEST" Solution of Light Delivery Problems



Model A—Panel Body  
Pneumatic Tires, \$925

**Flint Motor Wagon Department**  
**DURANT-DORT CARRIAGE CO.**  
Flint, Michigan



PLAIN COMPRESSION  
(Patented)

## Empress

BRASS AND STEEL  
GREASE  
AND  
OIL CUPS

WE MANUFACTURE  
a full line of Plain, Leather  
Packed, Ratchet, Marine,  
Spring Compression, and  
many other styles of Grease  
Cups.

Our line of Oil Cups is  
equally satisfactory and  
complete.

*Catalogue on Application*



WING TOP RATCHET  
(Patented)

**Bowen Manufacturing Co.**  
AUBURN, N. Y.

## Long Battery Life and High Capacity Are Best Combined in the GOULD Storage Battery

You can obtain these advantages only in Gould Batteries. That our hard plate is powerful and long-lived, is highly desirable and profitable can be confirmed by asking any Gould Storage Battery user, or we will cite plenty of actual performance records if you will tell us your battery requirements.

Our wide experience and special types of batteries for every service enable us to offer the right equipment for any electric pleasure or commercial vehicle, storage battery car, baggage truck, etc.

Gould Battery renewals fit any make of jar.



WRITE FOR LITERATURE TODAY

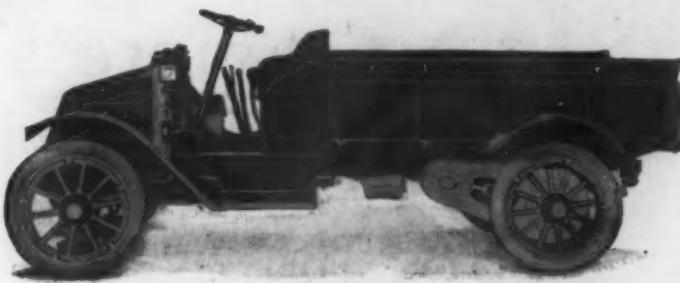
**Gould Storage Battery Co.**

General Offices: 341 Fifth Ave., New York

WORKS: Depew, N. Y.

Agents in all large cities  
Full stock carried in all cities where we have offices or agents.

(69)



**"Sandusky" Model "B" 1500 lb. Delivery Truck**

Complete as shown - **\$1750.00**

We also manufacture a 1½ ton truck

A "SANDUSKY" truck means Service, and Service is what brings repeat orders. We make the complete truck in our own factory and know that the material is the best and the workmanship cannot be excelled. No guess-work with us, nor do we have to depend on others for our parts. This is of great importance.

The special features incorporated in our trucks put us in position to give more value for the money than is possible to get in others.

Write for proposition. We will explain.

**Sandusky Auto Parts & Motor Truck Co.**  
Sandusky, Ohio, U. S. A.

## **FEDDERS** Real Square Tube Radiators

Commercial cars require radiators that will stand many shocks and much hard usage. This was one of the weak parts of the commercial car but the test of time has proved that **FEDDERS** radiators render efficient service.



Q We want to figure with you your requirements for the coming season. If you haven't used Fedders radiators you probably have had a great deal of radiator trouble and you may think that there isn't a radiator built that will give you satisfaction. If this is the case we would like to have an opportunity of demonstrating that the Fedders radiator will stand the wear and tear and shocks of the commercial car and that manufacturers who equip their commercial cars with the Fedders have practically no radiator trouble. We can convince you. Will you give us the opportunity?

**FEDDERS MFG. WORKS**  
BUFFALO :: NEW YORK

## **THE KINSEY MANUFACTURING CO.** TOLEDO, OHIO

*Manufacturers of Auto Parts—*

**Kinwood Radiators, Fenders**

**Kinwood Oilers, Gaskets**

**Kinwood Steel Frames, etc., etc.**

**SPECIAL METAL STAMPINGS**

## **BUCKEYE Motor Truck Jacks**

Buckeye Motor Truck Jacks are safe, reliable and made to stand the wear and tear for which they are intended. They are fully guaranteed, and cannot possibly drop with a load. They are made from Steel Drop Forgings, best finish and workmanship throughout.

Get our prices before you place your orders for jacks, we can save you money.

No.	Height Bar Down	Raise of Bar	Height Bar Up	Weight	Capacity	List Price
7	11½"	6½"	18"	16 lbs.	2½ tons	\$10.00
13	14½"	7½"	20½"	26½ "	3 "	15.00
14	14½"	7½"	20½"	33 "	5 "	16.00
9	11½"	6"	17½"	10 "	1½ "	6.00

Write today for descriptive catalog. Made only by

**THE BUCKEYE JACK MFG. CO., Alliance, Ohio**

When Writing, Please Say—"Saw Your Ad. in the C C J"

## These Careful Buyers Purchased

Capacity  
1500 Pounds

**Stewart**  
Delivery Trucks

Chassis  
31650

Here is a list of some recent purchasers of Stewart delivery trucks. These are all careful buyers—good judges of value. Each of them, before buying, investigated the Stewart thoroughly. Several sent their engineers to test the Stewart truck. When they placed their orders it was because they were satisfied that Stewart trucks offered the best value in the market.

The Post-Office Department at Washington has just awarded a contract for ten Stewart delivery trucks for Parcel Post Service.

The South Park Commission, Chicago, has just purchased two.

The New York Telephone Company, New York City, has signed a year's contract with us for its requirements of Stewart delivery trucks.

Atlantic City Telephone Company, Atlantic City, N. J., has bought one.

The Buffalo Fire Department has recently purchased one.

The Diamond Laundry of Los Angeles has ordered one.

The Buffalo Courier has added one to its fleet of delivery trucks.

The Hudsner Markets, big market merchants of Fall River, Mass., have just purchased two.

Emerson Brothers, furniture dealers, Brattleboro, Vt., have sent orders for two.

Keer's Lunch Rooms, Philadelphia, have just purchased one.

Crane Ice Cream Co., Philadelphia, has bought one.

The Taylor Ice Cream Co., of Buffalo, has purchased six.

Rosenstein, wholesale liquors, Newark, N. J., has bought one.

J. Moschel, meat packers, Buffalo, N. Y., has just ordered one.

Sinclair-Rooney & Co., wholesale milliners, Buffalo, have purchased one.

Stewart trucks save time and money for these purchasers. They will do the same for you. Let us prove it. Please 'phone or call for demonstration.

*Stewart Motor Corporation, Buffalo, N. Y.*

## SAGER Shock Absorbers

Absolute Necessity for Commercial Cars

### SUCCEED WHERE OTHERS FAIL



Endorsed by:

SAURER  
FRANKLIN  
ATTERBURY  
KISSEL KAR  
STEWART  
OLDSMOBILE  
ELMORE  
CRAWFORD  
LOGAN  
DORRIS  
RAMBLER  
MAXWELL  
STODDARD-DAYTON  
POPE-HARTFORD  
AUTOCAR  
COLUMBIA

Try a set at our expense

We also make bumpers to protect radiator and other vital parts at front of truck.

**J. H. SAGER COMPANY**  
293 South Ave. - - Rochester, N. Y.



## "The Coventry" Detachable Roller Chain

Note the large heavy-duty cotter-pin connecting the two rivets. The mechanical superiority of this method of coupling can easily be appreciated. Vibrations and jars cannot weaken the double-size coupling as in the case where two smaller cotter-pins, one for each rivet are employed.

Combine the established reputation of "The Coventry" Chains for precision, perfect retention of pitch and unparalleled durability with this final touch of perfection and you will understand why "The Coventry" Chains are consistently specified by those desiring the maximum of transmission efficiency.

Our catalog comprehensively covers "The Coventry" line, and will be sent immediately upon request.

**Sarco Engineering Co.**  
Dept. V 116 Broad Street New York

## SPLITDORF

"Always There"

Our new "TS" COIL is specially made for prolonged service on all the newer as well as older models of the SPLITDORF system.

Minor structural changes give the latest SPLITDORF MAGNETOS a more compact appearance — their efficiency is unbounded.

SPLITDORF PLUGS are standard — they are neither new nor experimental. For hard usage and service they are unequalled.

With the SPLITDORFLITE as the only self-contained electric lighting generator on the market the SPLITDORF ignition line is complete — its quality is guaranteed.

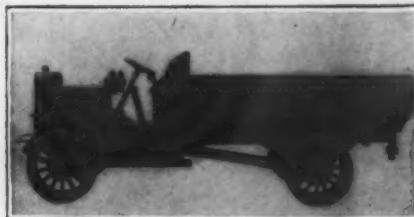
Write for "New Lights for Old."

**SPLITDORF ELECTRICAL CO.**

98 Warren Street, Newark, N. J.

### BRANCHES:

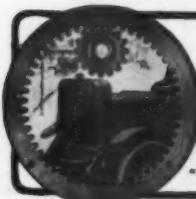
New York	Chicago	San Francisco
Boston	Detroit	Los Angeles
Philadelphia	Kansas City	Seattle
London		Buenos Aires



# MALS

1½—2—2½—3 Tons  
Internal Gear Driven (no chains)

Nickel steel—or better—from bumper to tail gate. The fact that 66% of our factory output is made up of re-orders is proof that the MALS is the best proposition for User and Dealer.



**MALS**  
MOTOR TRUCK COMPANY  
INDIANAPOLIS ... INDIANA

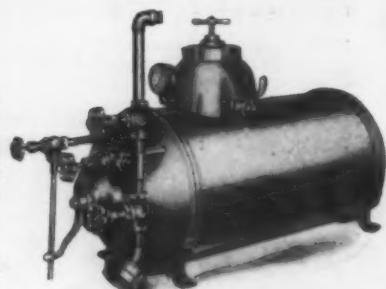
"The Truck Which Popularized The Internal Gear Rear Axle Drive"



## Chemical Fire Apparatus

### HAND EXTINGUISHERS and TANKS

of every description for department apparatus. We are equipped to make tanks of any size or type.



35-Gallon Copper Tank

We also provide a complete line of Chemical Engines, mounted on wheels for service in factories, towns, villages, etc. Hose Reels, Hose Axles, Ladders, Hooks, etc.



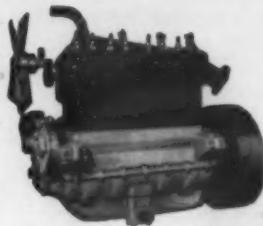
O. J. CHILDS CO.

48 Liberty Street  
UTICA, N. Y.

When Writing, Please Say—"Saw Your Ad. in the C C J"

# Continental

The Standard Motor for pleasure cars and motor trucks of quality.



Built by the world's largest motor manufacturers.

Continental motors carry a prestige and guarantee of worth for the products they propel.

4 and 6-cylinder types for every motor need.

Adapted to any self-starter.

**Continental Motor Mfg. Co.**  
Detroit, Michigan

FACTORY REPRESENTATIVE:  
K. F. PETERSON  
122 Michigan Blvd., Chicago, Ill.

# B. A. Gramm's Motor Trucks

Newest Designs, Latest Improvements; Built in every detail to insure satisfactory and permanent results.

Write for photographs, descriptive literature and the exceptional values we offer you—far beyond all others.

**The Gramm-Bernstein Co.**  
Exclusive Motor Truck Builders  
Lima, Ohio, U. S. A.



"The car of the hour" it has been many seasons! But it's more than that now. It stands alone—"the universal car." Nothing but a wonderful merit could have created so enormous a demand for it. Better get yours today.

There are more than 220,000 Fords on the world's highways—the best possible testimony to their unexcelled worth. Prices—rumabout \$525—touring car \$600—town car \$800 f. o. b. Detroit, with complete equipment. Catalogue from Ford Motor Company, Detroit, Mich.

## Chrome Vanadium Steel

During the year 1913 there will be more than 100,000 automobiles manufactured in which the springs and other small parts will be made of Chrome Vanadium Steel of our make.

The rough automobile usage subjects Chrome Vanadium Steel to its most severe service test and it is this important test that has evidenced the excellent quality of our product.

Our Chrome Vanadium Steel is made under our own secret process, patents for which are now pending.

*May we tell you how to overcome your breakage troubles?*

## The United Steel Co.

Canton, Ohio

New York

Chicago

Detroit

Cincinnati

# WAIT.

Express  
2000 L.  
Service

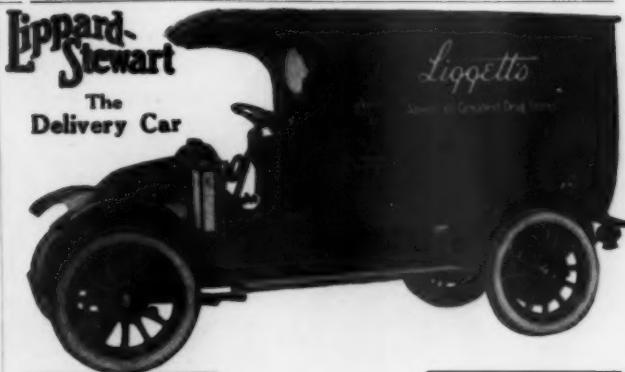
MORA  
WAGON

Price  
\$1400  
Chassis

—It will pay you. You'll want to get in on this New Commercially Right MORA. Details in this paper next month. They'll be ready sooner, however,—so if you want to get in touch early with a wagon full of real selling points, exceptional value at the right price, get your name on our list now—

The MORA POWER WAGON CO.  
5326 St. Clair Ave. Cleveland, Ohio

When Writing, Please Say—"Saw Your Ad. in the C C J"



## Lippard-Stewart Cars Guarantee Efficient Delivery

Lippard-Stewart Delivery Cars give service because they are built to give it. They assure quick and dependable delivery over a wide territory at the minimum cost per package, because they are constructed by engineers who know and have fulfilled every requirement demanded of a thoroughly efficient delivery vehicle.

### Read These Special Features of Lippard-Stewart Construction

Continental 30 H. P. Motor Timken Roller Bearings Throughout  
Eisemann Magneto Special Spring Suspension  
Brown-Lipe Selective Transmission Left-Hand Drive  
Cone-Clutch Every Part Easy of Access  
Full-Floating Timken Rear Axle Tires—35 x 4½ Front and Rear

Lippard-Stewart Motor Car Co., Buffalo, N. Y.  
August Becker, Pres. E. J. Barcale, Treas. J. C. Millar, Sec'y  
C. S. Dahlquist, Chief Engr. W. F. Reynolds, Sales Mgr.



## KING 3 1/2 Ton Truck

There is no question as to the quality and efficiency of the King. This means low cost of maintenance. If you want a truck that will do real work and stay on the road, it will pay to investigate.

*We can give you the service  
Territory for reliable agents*

**A. R. KING MANUFACTURING CO., Kingston, N. Y.**



## CROCE 1500 lb. Delivery Wagon

(Closed Body)

Price, Chassis, \$1,750.

Complete, \$1,850

Croce Delivery Cars are worth looking into whether you are agent or purchaser. Our cars are not built for the man that is looking for cheap material. This car is built to last and is built for the man that knows a good car. **THE TIME IS PAST WHEN COMMERCIAL CARS SELL BY THEIR LOOKS.**

Remember, Mr. Agent, you cannot build up a business of any standing with a fake-it-up proposition and stand good to build up trade. Get that idea out of your head;—this has been done long on pleasure goods and is done every day.

But Commercial cars are different, it must be the best to stand the test and this is none too good. Where are you standing, on cars not making good? Investigate Croce Trucks. You will thank yourself if you do. This is the time to do it. Send for Catalogue (A)—that will tell you what the Croce Cars are made from.

**CROCE AUTOMOBILE COMPANY : Asbury Park, N. J.**



CONSERVATIVE and DISCRIMINATING buyers are easily convinced that the CURTIS TRUCK is built for SERVICE.

## CURTIS Trucks are sold on their merits

Good propositions open to Reliable Agents. Write for catalog "C".

*Manufactured by*

**PITTSBURGH MACHINE TOOL COMPANY :: Braddock, Pa.**

**WESTON MOTT CO**

FLINT, MICH.

## AXLES, HUBS, RIMS OF HIGHEST QUALITY

Strength and durability are factors of the utmost importance and our products are made to meet the severest tests.



Specially Designed

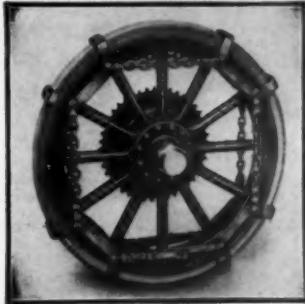
## ROWE TRUCK

In the Service of the Lifter Ice Cream Co.

The Lifter Ice Cream Company operates two Rowe Trucks in its regular service in West Philadelphia and Manayunk. The delivery is made in one-half the time made by wagons, and, in addition, each truck is enabled to take two wagon routes. No severer test can be given any truck than hauling ice cream, the packing of which is more or less destructive to trucks. The Rowe Truck has solved the difficult problem of ice cream delivery.

**Rowe Motor Manufacturing Co.**  
COATESVILLE, PENNSYLVANIA

## FEDERAL GRIPS



Designed and made **expressly** for solid tires. Built for **continuous** hard service. "Quick Attachable" and compact in form. Made of **nickel steel**. Will **not** injure the tires. Every set **guaranteed**.

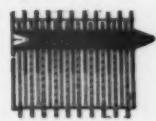
Territory open for good representatives.  
Catalog on request.

**FEDERAL CHAIN & MFG. CO.**  
SPRINGFIELD, MASSACHUSETTS

## THE EVANS' MODEL "HELE-SHAW" CLUTCH

(Patented)

is standard of the world on high-grade cars in America and Europe



Cross section of plate grooves

The cut shows details of wedge-shaped annular grooved plates used in "Hele-Shaw" Clutch. They combine the best of the cone and disc principles. The "Hele-Shaw" Clutch has a grip like a vise, but is slippable indefinitely, giving the car a capability of speed ranging from a *creep* to its full power.

The "Hele-Shaw" Clutch is absolutely self-contained and removable as a whole at any time.

### Pressed Steel Case

In use on over 100,000 cars of over 250 makes.

Send for catalogue No. 7 giving bore, stroke and number of cylinders.

**MERCHANT & EVANS COMPANY**

*The Premier Metal House in America*

PHILADELPHIA



New York Brooklyn Chicago Kansas City  
Baltimore Wheeling Cleveland Denver



For  
Dependable  
Heavy Service

We have been makers of motor trucks for eight years, and will gladly furnish any information to dealers desiring to represent a substantial company and a quality truck.

**Abendroth & Root Mfg. Co.**

Since 1867

New York  
Main Offices and Works

46 Church Street  
Newburgh, N. Y.

THE GOVERNOR  
of the Krebs puts it in  
a class without a rival.

It does not merely prevent  
the driver from exceeding a  
set rate of speed.

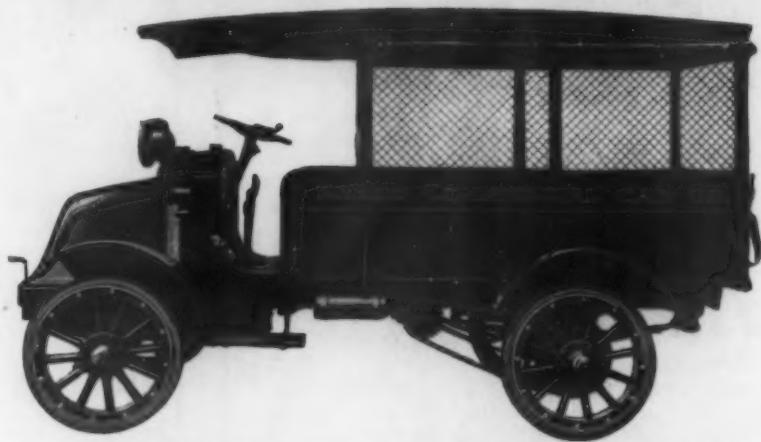
It is the only governor that  
is *variable*, and is on duty  
at all speeds up to the  
maximum.

Set at any rate desired, the  
Krebs governor gives the  
motor precisely the amount  
of gas needed to maintain  
that rate absolutely—uphill,  
down hill—good roads or  
bad.

*The driver has nothing to do  
but steer.*

*Write today for complete in-  
formation about all of the  
Krebs models and open ter-  
ritory for dealers.*

## THE KREBS "The Car That Thinks"



Model AA Krebs, one ton. With 4 cylinder, 4 cycle, 3½ by 4½ motor.  
Price, chassis only, \$1425.

Model AA, with screened body as shown above, \$1600 f.o.b. Clyde, O.

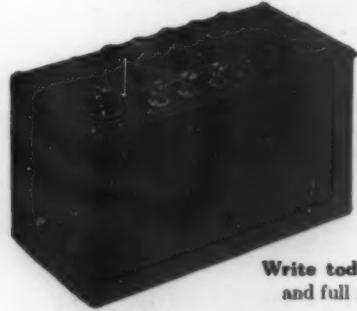
**THE KREBS COMMERCIAL CAR CO., Clyde, O.**

### Force-Feed Oilers with two compartments

Detroit Force-Feed Oilers are made with **two** compartments (as well as one) for feeding two different kinds of oil. One compartment feeds gas-engine oil to the cylinders—the other feeds a cheaper, heavier oil to the bearings, etc.

The use of the **second** compartment gives an accurately measured feed to each part, a completely centralized system and freedom from all annoyance, wasted oil and damage to the engine.

For every kind of truck



Write today for catalog P-67  
and full information.

**DETROIT LUBRICATOR COMPANY.**  
DETROIT, U. S. A.

*Largest manufacturers of lubricating devices in the world.*

When Writing, Please Say—"Saw Your Ad. in the C C J"

One-Shell Type Without Band

### Seamless Steel Tanks

for GASOLINE and AIR UNDER PRESSURE in connection  
with Air Starter Equipments and Forced Gasoline Feed  
on Pleasure and Commercial Cars

**All Sizes and Styles**  
(in cylindrical shapes)

Light in weight, attractive in appearance, safer than welded  
or riveted containers of twice their weight. Send us your  
specifications.

We Are Manufacturers, Not Jobbers

**Federal Pressed Steel Co.**  
MILWAUKEE, WIS.



Two-Shell Banded Type



## On In a Jiffy Off In a Trice

Time saved! That's only **one** of the tremendous advantages offered you by



### Individual Block Truck Tires

With this tire, one block can be adjusted without reference to any other block. Each is held tightly in place by its own **individual fastening**. To remove a block, just unbolt the plate, pry up, and out comes the block. And it goes on just as easily.

Thus each block can be kept perfectly adjusted at all times. Working loose is prevented and the tire gives longer service as a result.

This tire, furthermore, saves an enormous amount of time and trouble. All that is needed to remove blocks is the simplest kind of a wrench. Because of its simplicity, hundreds of users claim this to be the most perfect tire of its kind made.

### A Tire For Every Service 7 Great Tires In All

With the Goodyear Individual Block Truck Tire, we also make 6 other great tires for trucks—each built by Goodyear experts to do a certain kind of work—each doing this work perfectly and with utmost economy.

We invite all truck owners to investigate Goodyear Truck Tires and the service that goes with them.

*Write for Our Book on Truck Tires*

### The Goodyear Tire & Rubber Co. AKRON, OHIO

Branches and Agencies in 103 Principal Cities

We Make All Kinds of Rubber Tires, Tire Accessories and  
Repair Outfits

Main Canadian Office  
Toronto, Ontario

Canadian Factory  
Bowmanville, Ontario

When Writing, Please Say—"Saw Your Ad. in the C C J"

## Why Do Bearings and Gears Wear Out?

**FIRST**, let us analyze friction. Friction is the resistance or retarding force set up by two surfaces rubbing against one another. Each surface exerts an almost constant pull on the particles making up the other surface. The surface of the two which can the better withstand this frictional pull will be the surface to remain unworn. The bearing metal should be so designed as to give way before the steel. But the bearing metal should not give way to this pull too easily. That would mean quick bearing wear.

**THE** cohesive strength of the bearing metal should approach that of the steel as nearly as possible, just so it keeps under it. Such a metal is



THE interlocked, cohesive, fibrous structure of NON-GRAN makes it almost impossible for the steel shaft to pull away the particles making up the surface which is presented to this pull. In NON-GRAN, the particles forming the bearing surface are all knit to, and therefore held down by, the particles **beneath** the surface.

THE great value of NON-GRAN as a promoter of silent and long-lived motors is made manifest by its exclusive adoption by the builders of the country's finest motor cars and motor trucks.

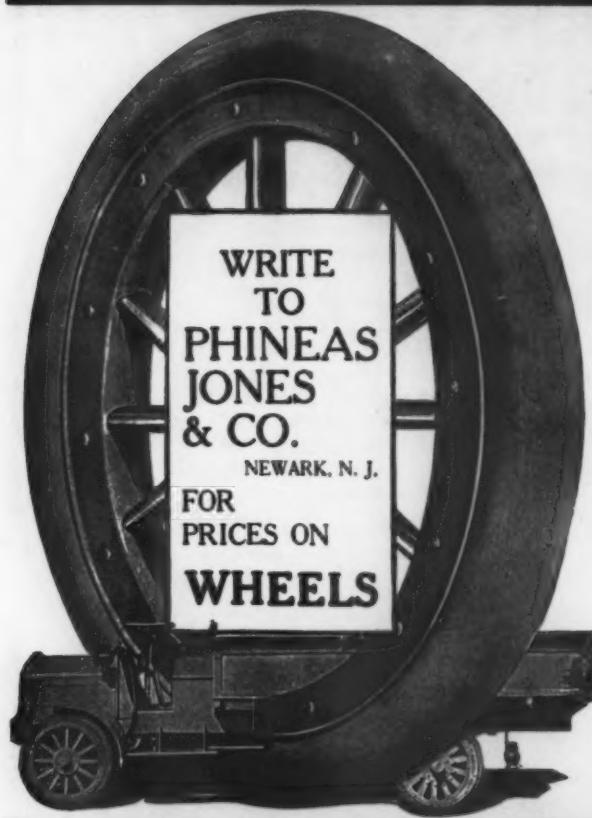
WE point with pride to the performance and lasting qualities of cars such as the "Simplex," "Marmon," "Stevens-Duryea," "Saurer," "Kelly," "Garford," etc.

LET us send you a sample of NON-GRAN so that you may examine its famous knit-together structure.

**AMERICAN BRONZE COMPANY**  
1127-1175 Chester Avenue  
BERWYN, PENNA.

*Sole manufacturers of NON-GRAN and largest  
exclusive manufacturers of bearing  
bronze in the world.*

**Wear on a Worm Gear is Brought About by the Same Forces That Cause Wear in a Bearing. The Combination of Its Wear-Resisting Qualities and Its Tremendous Strength is Responsible for the Phenomenal Service Given by NON-GRAN in This Duty.**



# AUTOMOBILE WHEELS for PLEASURE CARS and TRUCKS

*Repairing and truing old wheels  
a specialty*

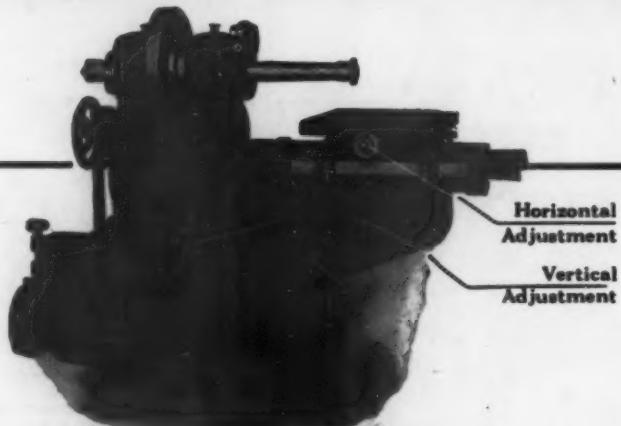
*Experimental wheels a specialty*

*We furnish and apply any style  
demountable or detachable  
rim or tire*

**BEST ON EARTH—KANTSAMORE**  
ESTABLISHED 1855

## PHINEAS JONES & COMPANY

305-313 Market Street :: Newark, N. J.  
Branch Factory: 12th Avenue and 55th Street, New York City



The Heald Cylinder Grinding Machine

## NINE CYLINDERS OUT OF TEN

**Require individual adjustment when being ground**

This has been proved beyond controversy by our operators throughout the country. Therefore, when buying cylinder grinding machines, select machines provided with both vertical and horizontal adjustments.

### HEALD CYLINDER GRINDING MACHINES

are equipped with adjusting screws fitted with micrometer dials for accurate adjustment, both horizontally and vertically—an advantage found only in the HEALD. Only a fraction of the cylinders come from the boring mill with holes square with the flange at the crank end, and with centers in the same plane. It is, therefore, often necessary to make minute horizontal and vertical adjustments on the grinding machine to make up for these irregularities.

We've a new Cylinder Grinding book that describes fully all the new and improved features in the Heald Cylinder Grinder. Let us send you a copy—you may find some valuable suggestions in it.

**THE HEALD MACHINE CO., 16 New Bond Street, Worcester, Mass.**

# Truck Economy is Dependent

## Upon Knowledge of Truck Mileage

Veeder

Hub Odometer

\$25

At Your Dealer's or  
Direct from Factory



You, as a commercial car user, must look upon the money paid for trucks as just as much of an investment as money paid out for supplies, additions, stocks, etc., and you should insist on a proper return from this investment as well as upon the others.

To make your truck investment pay it is **absolutely essential** that accurate records be kept of the distance the truck travels. By such records, and only by these records, can you check your tire guarantee, your drivers' capabilities, gasoline and oil consumption per mile, cost per ton for each mile, etc., etc.

The VEEDER HUB ODOMETER will do this necessary work for you. It registers backwards as well as forward. It is sealed, so cannot be tampered with or altered. It simply takes the place of the regular hub cap and **can be attached by any mechanic.**

### No Intricate Wiring, No Cables No Magnets, No Tubes

All we need to know is make, model, size of wheel and year of manufacture of your truck. We ship the HUB ODOMETER to you and you do the rest. Being made by the Veeder Manufacturing Company, whose recording instruments are world-famous in all lines of business, is a sufficient guarantee that the VEEDER HUB ODOMETER is simple, accurate and durable.

*Send for Catalogue D, descriptive of HUB ODOMETER.*

**The Veeder Manufacturing Co., Hartford, Conn.**

Makers of Cyclometers, Odometers, Tachometers, Tachodometers, Counters  
and Small Die Castings.

## CULLMAN SPROCKETS and Differentials

in stock and to  
order.

Send for catalog  
and let us quote  
you on your re-  
quirements.



**CULLMAN WHEEL COMPANY, CHICAGO**  
1351 GREENWOOD TERRACE



**\$850.00** Either Pneumatic or Solid Tires  
This is but one of our Models

## Do You Realize

that the **Parcel Post** will  
create an enormous de-  
mand for

### Light Delivery Trucks?

Are you ready, Mr.  
Dealer?

Have you the line for  
this demand?

**THE COMMERCE CAR** is the logical motor wagon  
for the Parcel Post Delivery. We are ready to meet your requirements.  
Wire or write now for an agency proposition. We have some open territory.

**THE COMMERCE MOTOR CAR COMPANY**

General Offices: 633-639 Penobscot Building

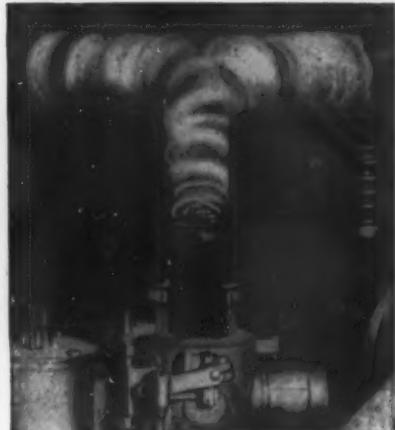
DETROIT, MICHIGAN

## Reduces Gasoline Bills 25 to 40%!

The New Carburetion Method

**MONDEX-HELIX**

in Combination with any Carburetor



*The Mondex-Helix Mixer*

Saves one-fourth to about one-half gasoline and doubles  
the power of poor gasoline.

Gives 100% increased flexibility. Increases power on hills  
and all grades—at minimum and maximum speeds—from  
10% at high speed, to 50% at low speed—particularly heavily  
loaded vehicles.

Makes a noisy motor silent and smooth. Prevents back-  
firing and carbonization. It minimizes wear and tear.

Used by the Consolidated Gas Co., I-T-O-A Cab Co., Knox Automobile Co., Selden Motor Vehicle Co., Western  
Electric Co., Long Island R. R. Co., Mason-Seamon Transportation Co., U. S. Motor Cab Co., N. Y. Telephone  
Co., John Wanamaker, Stern Bros., Brooklyn Eagle, Burns Bros. and hundreds of other large concerns.

Sizes for any carburetor sent, with full instructions, C.O.D. or by mail on receipt of price.	
Sizes 1 inch to 1½ inch . . .	<b>\$3</b>
Sizes 1½ to 2 inches . . .	<b>\$4</b>

AGENTS WANTED

**THE ARISTOS COMPANY**  
254 W. 54th St., N. Y.

**The  
Largest Makers  
of All-Steel  
Split-Nut  
Steering Gears  
in the  
United States**

We make more steering gears for trucks from 1000 lbs. to seven tons than any other steering-gear manufacturer.



**WHY?**

**BECAUSE:** The truck manufacturers recognize the Lavigne Gear to be of superior design and the ultimate user knows it.

**Standard For:**—Commercial Cars and Trucks, 1000 lbs. to 7 tons capacity;

Heavy Fire Apparatus;  
Pleasure Cars, weighing from 2000 lbs. to 5500 lbs.

Four Sizes, "A", "B", "C" and "E"

*Write for Blue Prints*

**THE LAVIGNE GEAR CO.,** Racine, Wis., Station "A"

**BALL ~ BEARINGS**

**HB DWF**

**The Hess-Bright Manufacturing Company**  
*Pioneers in the introduction of Annular Ball Bearings*

Most extensive resources and plants in existence devoted exclusively to ball bearing manufacture. Enlarging and improving facilities, product and capacity for distribution.

Main Offices and Plant No. 2 on line of Penna. R. R. to New York  
41 E. Erie Avenue, Philadelphia, Pa.

Stores for Retail Distribution:

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## STEEL HOUSINGS



True Steel Castings  
for Worm-Drive  
Sprockets  
Radius Rods  
Spring Hangers  
Front Axles      Steel Wheels

Greatest strength,  
smooth and clean-cut.

Every casting an-  
nealed. Soft and easy  
to machine.

Send blue-prints for prices.

DETROIT  
MICH.

**MICHIGAN STEEL CASTING CO.**

## We Want Agents

to share in the GOOD WILL of a corporation with \$11,000,000.00 of capital,  
with twenty years' experience and with 20,000 customers.

Our SIX factories at Detroit; Cleveland; Erie, Pa.; Chicago Heights, Ill., and  
Franklin, Pa. (2), are turning out high-grade machinery products that are sold  
and used in every quarter of the globe.

The "Little Giant" Commercial Car is one of these products.

**Capacity  
One Ton**



**Any Style  
of Body**

*Write for Prices and Terms. Address Dept. M.*

**Chicago Pneumatic Tool Company**

1010 FISHER BUILDING  
CHICAGO

Branches  
Everywhere

50 CHURCH STREET  
NEW YORK

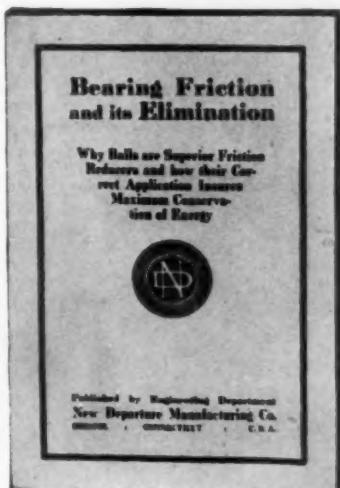
## STANDARD Adjustable Taper Roller Bearings



After exhaustive tests, S.R.B. Taper Roller Bearings have been selected by the following motor truck manufacturers for use in their wheels:

Peerless, Packard, Kelly, Seagrave, Atterbury, Babcock, Blair, Mack, Brockway, Chase, Hatfield, Harwood-Barley, Jeffery, Kissel, Mais, Poyer, Modern, Reo, Rowe, Sanford, Schacht, Selden, Service and many others. The Rolls of S.R.B. Taper Roller Bearings offer an effective bearing surface over their entire length, thus giving the bearing a greater radial load capacity for a given width of bearing than is possible with any other design. The large shoulder on the Cone allows of the bearing taking a maximum end thrust with a minimum wear. For prices and further data, write,

**STANDARD ROLLER BEARING COMPANY, Philadelphia, Penna.**



## Can we send you a copy of this Booklet?

Our Engineering Department has published the first of a series of booklets discussing the latest developments in the solving of bearing problems.

This first brochure is entitled "Bearing Friction and Its Elimination," and aims to show why balls are superior friction reducers and how their correct application secures maximum conservation of energy.

The types of bearings particularly discussed and compared in this writing are the ball and roller bearings, as applied to all bearing points in the motor car.

It discusses and explains the growing tendency among engineers and manufacturers to favor the ball type of bearing, as evidenced by the summarization figures published by the "Horseless Age" in a review of 1913 pleasure car models.

These figures show that ball bearings are used in the differential of 53% of pleasure cars for 1913, as against 37½% of the 1912 models; in the transmission of 75%, as against 64%; and in the rear wheel of 52%, as against 42%.

This brochure will interest you. Copy will be mailed you promptly on request.

**THE NEW DEPARTURE MFG. CO., Bristol, Conn.**

Western Branch: 1016-17 Ford Building, Detroit

# WARNER

# Who's Who--



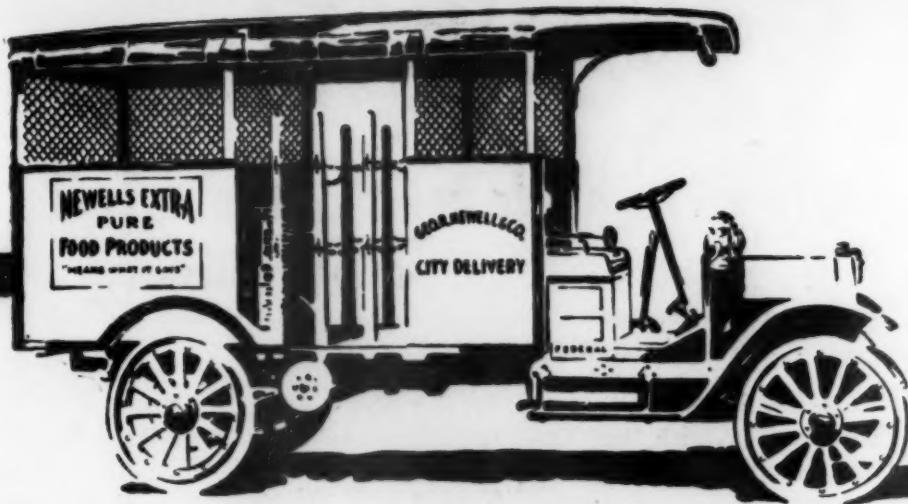
**The Warner Manufacturing Company**  
Toledo, Ohio

**T. W. WARNER, President-General Manager**

# TOLEDO

**When Writing, Please Say—"Saw Your Ad. in the C C J"**

# FEDERAL



## Make Your Own Investigation But Make It Thorough

We can tell of Federal service--actual service--in almost every line of business.

We can show records of more than three years of the most severe tests any motor-driven vehicle was ever subjected to.

We can refer to more than 1000 satisfied Federal owners and feel secure in the knowledge that their expressions will confirm all we can say of Federal quality and Federal character.

We simply ask that you do yourself the favor of investigating Federal efficiency, Federal economy, and Federal Reputation in your own business.

Write us for the names of the Federal owners in your line.

**Federal Motor Truck Co., Dept. A, Detroit, Mich.**



## Delivering New York's Mail

THE New York Post Office system is the largest in the country. It transacts six times as much business as Chicago and four times as much as Boston and Philadelphia combined.

The New York Mail Company is operating *seventy-five giant Garford trucks* in connection with the New York Post Office to rapidly dispatch and promptly deliver the enormous daily mail, packages and the Parcel Post matter of the greatest, most economical and most profitable municipal postal system in the world.

The Garford truck has the chassis construction and is backed by a thorough and practical service, which makes it, beyond question, America's foremost and most economical truck.

*You can use Garford trucks to advantage—in your business.*

It will pay you to investigate.

Literature or representative on request. Please address Department 11.

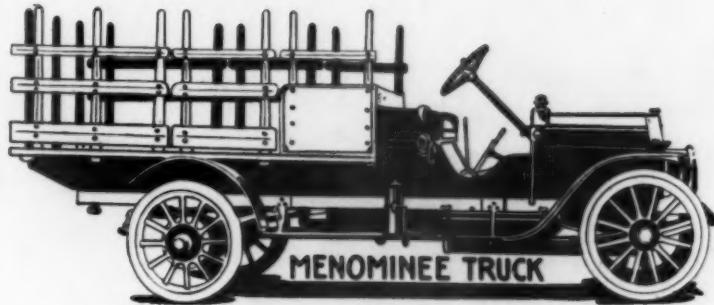
**The Garford Company, Elyria, Ohio**



A portion of the big Garford fleet operated by  
The New York Mail Company

# "THE MENOMINEE"

## Motor Trucks



**1500 lbs.**—Carrying capacity complete with Express or Stake Body - - \$1200.00

**2000 lbs.**—Carrying capacity complete with Express or Stake Body - - \$1500.00

**3000 lbs.**—Carrying capacity complete with Stake Body - - - - \$1950.00

To you Dealers and Users who, in a large measure, are responsible for the tremendous demand for a light, neat and strongly constructed motor wagon, we offer "THE MENOMINEE" Motor Truck. Users and Dealers who have become acquainted with the construction and efficiency of the truck during the two years it has been on the market, will gladly recommend it to you.

*Write for Our Free Illustrated Catalogue and Agency Proposition*

**4-Cylinder Unit Power**

**Plant**

**Sliding-Gear Transmission**

**Shaft Drive, Transmitting Through Special Reduction Gear**

**Full-Floating Rear Axle**



**D. F. POYER COMPANY**  
**MENOMINEE** **MICHIGAN**

# United States Standard Motor Truck Tires

(Demountable)



are the most easily  
manipulated tires  
on the  
market

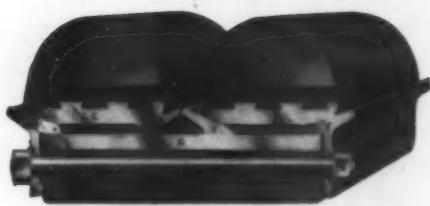
Do  
This—



Then  
This—



Then This—



Cross Section of the United States  
Standard Motor Truck Tire

and your  
Tire is off

**Absolutely Guaranteed for 10,000 Miles**

Conditional upon this mileage being used within one year

**UNITED STATES TIRE COMPANY, New York**



Capacity One Ton

Price of Chassis \$2000

## HERE IS THE BEST ONE-TON TRUCK ON THE MARKET. THE

Selden Truck has set an absolutely new standard for one-ton trucks.

It is designed and constructed to meet the rigid requirements of trucking service. It is not a bundle wagon, but a real truck for heavy work, and is recognized as the highest type of commercial car in its class.

## THE SELDEN TRUCK

**Is Sold on Time Payments**

And is within easy reach of the thousands of merchants and manufacturers who don't find it convenient to pay cash. Our plan provides a simple and easy way of owning a truck of the highest efficiency, without imposing upon the purchaser any heavy financial burden.

*Our Agency Proposition is the Most Attractive Ever Offered  
Write at Once for Catalog and Details of Our Sales Plan*

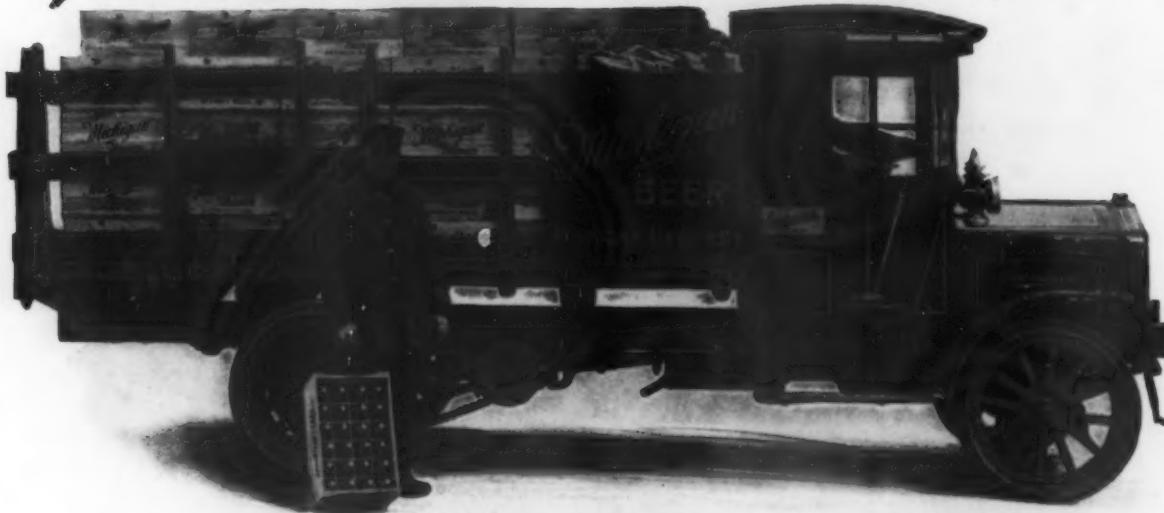
## SELDEN TRUCK SALES COMPANY

207 East Avenue, ROCHESTER, N. Y.

# "Fitting the Truck to the Service"

*Standard*

3 TON TRUCK  
\$2750.00



**M**OTOR TRUCKS suitable for coal or sand are not adaptable to stage scenery,—or telegraph poles. That's why **Standard** trucks are built in twelve lengths of loading space, ranging from eight to twenty-two feet, and five lengths of wheelbase.

**M**OTOR TRUCKS with gear reduction between motor and rear wheels, suitable for the smooth level pavements of cities like Detroit, Buffalo and Indianapolis, are not suitable for the hills of Cincinnati, Pittsburgh and Seattle,—that's why we have eight different gear ratios for **Standard** trucks.

**RESPONSIBLE DEALERS** who are interested in a real profit-making proposition that has no "Unproved Theories" in it, should write us at once. You don't know of a better motor than the Continental, do you,—nor axle and jack shaft better than Timken,—nor transmission and clutch better than Brown-Lipe,—nor drive shafts and universals better than Spicer,—nor springs better than Perfection,—nor steering gear better than Gemmer? These are some of the "Standard" specifications. Just ask yourself this question:—"How would you like to compete against this array of specifications?"

**Standard Motor Truck Company**  
Detroit, Mich.

When Writing, Please Say—"Saw Your Ad. in the C C J"

# CONTROL YOUR REPAIR BILLS

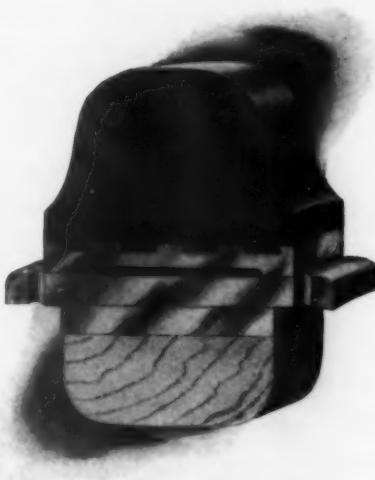
by Using

# GIBNEY WIRELESS TIRES

Tire replacements represent one of the biggest upkeep items--for owners who are content to equip their cars with experiments.

Get in line with those who know better --- who have learned from costly experience.

**GIBNEY WIRELESS TIRES** were a success 3 years be-



fore other manufacturers dared advocate wireless tires; today, while others are striving to imitate, they are still the greatest success in the field.

*Write for prices and descriptive matter*

## GIBNEY Tire & Rubber Co.

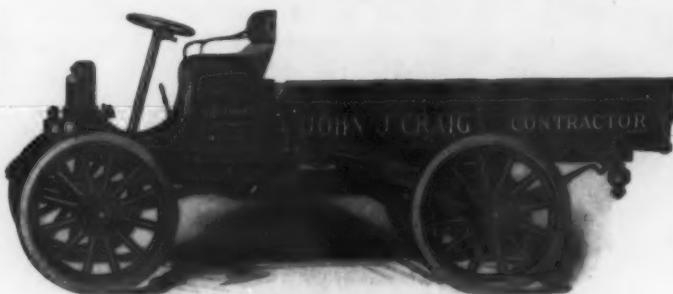
Philadelphia

New York

FACTORY: CONSHOHOCKEN, PA.

**\$986**

Model "C"  
Express Body  
F. O. B.  
Cincinnati, O.  
Completely  
Equipped



**\$986**

Model "D"  
Stake Body  
F. O. B.  
Cincinnati, O.  
Completely  
Equipped



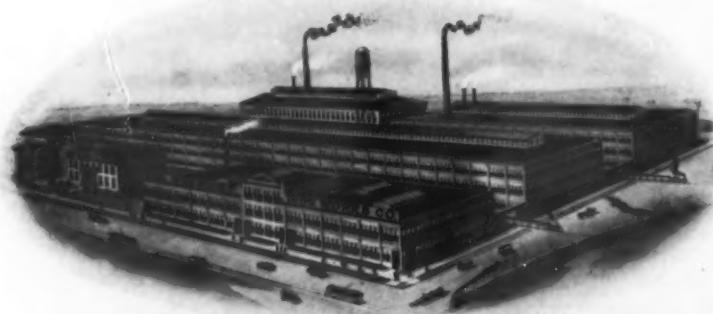
## **-WILL DELIVER THE GOODS-**

THE STEWART ONE-TON TRUCK HAS SOLVED ALL THE DELIVERY PROBLEMS. Hitherto it has been necessary to pay BIG PRICES for trucks of the STEWART'S carrying capacity. STEWART'S PRICES have brought these initial costs tumbling down to a level that puts them in the reach of every horse-drawn vehicle user.

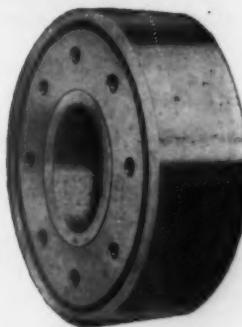
Constructed for a 50 per cent overload and Guaranteed for one year by THE STEWART IRON WORKS CO., a firm of unlimited resources, and a reputation backed up by 27 years of actual experience.

NOW, MR. DEALER—Here is the Biggest Money-Making Chance in the automobile field today. A ONE-TON TRUCK COMPLETE and selling for less than \$1000. Your commission is a profit, not a loan.

## **-WHERE THE STEWART TRUCKS ARE BUILT-**



**THE STEWART IRON WORKS COMPANY, CINCINNATI, OHIO**  
MAIN OFFICE AND FACTORY, "COVINGTON"



## Eleven Facts About HYATT QUIET BEARINGS

**FACT 1.** Hyatt Roller Bearings afford a line (—) bearing instead of a point (.) bearing as is the case with ball bearings. There is more surface to carry the load, yet with but little friction. They are American bearings for American roads.

**FACT 2.** Hyatt Roller Bearings are flexible. They give under shock, still are rigid enough to carry their load and remain round.

**FACT 3.** Hyatt Roller Bearings are quiet. Noise is caused by the vibratory motion of any solid substance. Shocks and jars produce vibrations which rigid bearings transmit and intensify. The flexibility of the Hyatt Roller cushions shocks—absorbs vibrations—hence reduces noise.

**FACT 4.** Hyatt Roller Bearings will retain a large quantity of Lubricant because the rollers are hollow. The spirals in the rollers alternate from right to left, thus constantly distributing the lubricant in all directions over the surface of the rollers.

**FACT 5.** Hyatt Roller Bearings have no delicate adjustments to be tampered with after the car has left the factory. Carelessness, curiosity or ignorance will not cause trouble by making improper adjustments in Hyatt Bearings as is often the case with others.

**FACT 6.** Hyatt Roller Bearings are less liable to Accident or Injury because they carry the same load on a larger surface than ball bearings afford.

**FACT 7.** Hyatt Rollers Never Crowd or pile up in a bearing, thereby grinding and destroying the entire bearing.

**FACT 8.** Hyatt Rollers Will Not Crack or split as balls sometimes do when the wheels drop into a rut and the car is heavily loaded, thus causing annoyance, delays and expensive repairs.

**FACT 9.** Hyatt Roller Bearings reduce excessive and unnecessary Wear because they relieve gears and shafts of undue strains resulting from imperfect alignment.

**FACT 10.** Hyatt Roller Bearings are made only from carefully Selected Steels which are chemically and physically tested, heat treated and ground.

**FACT 11.** Hyatt Roller Bearings were used on 91.7 per cent. of all pleasure and commercial cars that were manufactured during the season of 1912.

**HYATT ROLLER BEARING CO.**  
**DETROIT, MICHIGAN**

WILMINGTON, DELAWARE

When Writing, Please Say—"Saw Your Ad. in the C C J"



This

## Baker Electric Truck

This 2-ton Baker Electric Truck is *earning money* for its owners at the rate of nearly \$12 a day, *net*. Its entire cost of operation has not exceeded \$6 per day. Yet it does the work of three wagons and six horses.

It has never run out of current, even in the 14-hour-a-day grind on hills and snow. It doesn't require a mechanic to run it. Its driver never rode in an automobile before.

No wonder that the Haas Bros. Co. have placed a second order and are standardizing on Baker Electric Trucks.

It is because of such records of economy and efficiency as this that

**Saves**  
**\$68**  
**Per**  
**Week**

### 75% of Electric Trucks Sold Last Year Were on Repeat Orders

The Baker will **MAKE GOOD** in your own delivery problems. It will save money over horse or gasoline equipment. It is the **LOGICAL** Truck of today. Let us help you investigate.

**Baker**  
**Electrics**



#### "Why An Electric Truck?" Sent Free—Write

500-pound to 4-ton sizes, also tractors up to 8 tons haulage capacity—built by the largest exclusively electric vehicle manufacturers in the world.

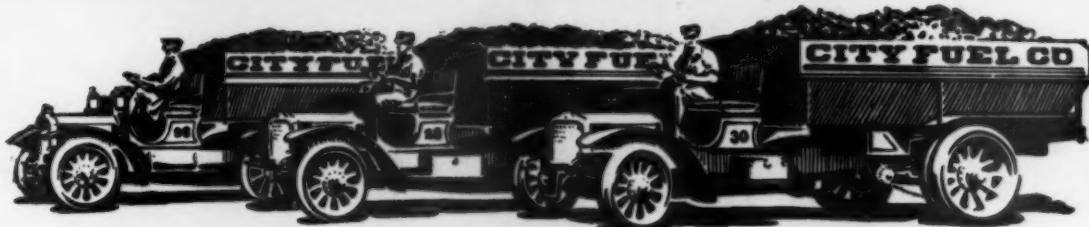
**The Baker Motor Vehicle Company, Cleveland, Ohio**

Makers also of Baker Coupes,  
Victorias, Broughams, etc.

CANADA: The Baker Motor Vehicle Co. of Canada, Ltd., Walkerville, Ontario

Branches or Representatives in Principal Cities

Applications Solicited for Representation in Open Territory



After exhaustive tests of the principal American and European trucks, the City Fuel Company and the Star Motor Delivery Company of Chicago placed an initial order for 75 of our trucks

## International Motor Trucks

Proved by years of successful service

**Mack** 12 years in use   **Saurer** 18 years in use   **Hewitt** 10 years in use

**14 trucks saved \$103.60 per day—\$7.40 per truck per day**

Here are the figures taken from the regular cost-sheets kept by the City Fuel Company of Chicago:

For November, 1912

	Total cost	Aver. cost per truck	Cost per ton
Gasoline .....	\$431.76	\$30.84	\$0.0347
Lubricating Oil.....	54.79	3.91	0.0044
Wages—Helper, Driver .....	1,247.95	89.14	0.1003
Labor—Loading Mechanic and Repair Men.....	245.60	17.54	0.0197
Repair Parts and Material.....	146.17	10.44	0.0117
Garage .....	140.00	10.00	0.0112
Light and Power.....	3.64	0.26	0.0003
Insurance—Fire .....	58.38	4.17	0.0047
Liability .....	143.34	10.24	0.0115
Miscellaneous Expense .....	39.14	2.80	0.0031
Tires .....	396.52	28.32	0.0319
Depreciation, at 20% .....	979.81	69.99	0.0789
License .....	42.00	3.00	0.0033
 Totals .....	\$3,929.10	\$280.65	\$0.3157
 Total Cartage Earnings.....	<b>\$6,551.43</b>		
Net Earnings.....	<b>2,622.33</b>		
Net Earnings per Truck per Day.....	<b>7.40</b>		

Our trucks prove their superiority by overwhelming evidence—made by fleets large and small all over the world, in all kinds of business, year after year during the past 10, 12, 18 years of motor-truck history.

No one else can prove their trucks in this way, nor give you:

Nine sizes, capacities: 1, 1½, 2, 3, 4, 5, 6½, 7½ and 10 tons. Bodies for every use. Service stations with factory equipment in all large cities. Duplicate parts always assured.

*Write today for facts of value in your business*

### International Motor Company

General Offices: Broadway and 57th St New York      Works: Allentown Pa; Plainfield N J  
 Sales and Service Stations: New York, Chicago, Philadelphia, Boston, Cleveland, Cincinnati, Buffalo, Baltimore, Newark  
 Pittsburgh, St Louis, Atlanta, Kansas City, Denver, Minneapolis, St Paul, San Francisco, Los Angeles  
 and other large cities  
 Canadian Sales Agents: Canadian Fairbanks-Morse Company, Limited, Montreal



When Writing, Please Say—"Saw Your Ad. in the C C J"

# Universal Motor Trucks

## Worm Drive

After two years of experimenting, we have adopted for our one-ton Universal Motor Truck the best standard English design of worm and worm wheel built here with imported machinery.

### Is This Form of Drive Reliable?

Absolutely.

This driving mechanism has stood the stress and strain of 10,000 miles of hard work, over country roads and city streets, on five test trucks that have been in experimental service since last spring.

### Is Worm Drive Best?

Certainly.

The worm drive as a means of motor-truck propulsion has been successfully used in Europe for years, but American manufacturers have been slow to take up the worm drive, because of existing patents.



The worm used in the Universal one-ton truck is a hardened steel forging. The worm wheel is made of a special bronze.

### Special Features of the Universal One-Ton, Worm-Drive Truck

Rated capacity, 2,000 pounds; guaranteed weight, 1½ tons.

Weight, 3,300 pounds.

Engine: Mono-bloc; four cylinders; long stroke; enclosed valves.

Full 30 Horsepower.

Dual Ignition.

Full tired; front wheels, 34" x 3½"; rear wheels, 34" x 5".

Wheelbase, 130".

Loading space, 10 feet long and 3 feet from the ground.

Left-hand drive; center control.

Full-floating axles; Timken bearings; enclosed brakes; pressed-steel frame, and many other splendid improvements.

Motor truck dealers will realize that in making prices on this one-ton

truck we are inaugurating an entirely new departure in selling motor trucks.

We assume that when a customer wants a truck, he doesn't want to buy a chassis.

What he wants, is a complete outfit.

We are, therefore, quoting prices on this truck with two types of standard bodies, complete in every respect, fully equipped, painted, ready to put to work.

#### Prices

Standard Stake Body - \$2,000.00

Standard Express Body - \$2,050.00

Painting, optional, with any standard colors.

In case a special design of body is desired, we will charge \$1,950.00 for the chassis, driver's seat and equipment.

These prices are for cash only, F.O.B. Detroit.

#### Really a 1½-Ton Truck

This truck, although rated at one ton, is really a 1½-ton truck at a one-ton price.

The reason we can put the materials and improvements into this truck and sell it so cheaply is because we manufacture in such large quantities.

Our factories, in Detroit, are the largest factories in the country devoted exclusively to making high-grade trucks.

#### Other Models

We also manufacture and sell the Universal two-ton chassis, \$2,800.00 and the Universal Standard three-ton chassis, \$3,400.00, F.O.B. Detroit.

Motor truck dealers will find our selling contract a most liberal one.

## UNIVERSAL MOTOR TRUCK COMPANY

Factories:—Detroit, Michigan, U. S. A., 507 Theodore Street. FRED K. PARKE, Gen. Mgr.

When Writing, Please Say—"Saw Your Ad. in the C C J"